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TRAFFIC SURVEY

BOZEMAN

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Aerial View of Central Business District

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URBAN AREA TRAFFIC SURVEY
BOZEMAN, MONTANA

CONDUCTED BY THE

MONTANA HIGHWAY COMMISSION
PLANNING SURVEY
AND
THE CITY OF BOZEMAN

IN COOPERATION WITH

U. S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS

1953

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W. G. LOWE, Mayor

HOWARD ERWIN, City Commissioner

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STATE OF MONTANA
HIGHWAY COMMISSION
HELENA

July 31, 1954

The Honorable M. E. Henderson,
City Manager
and
City Commissioners
Bozeman, Montana

Gentlemen:

In presenting this report on the Bozeman Traffic Survey conducted during August 1953, we are pleased to have had a part in this cooperative study with the City of Bozeman and the U.S. Bureau of Public Roads.

We hope that the report will be of value in alleviating some of the traffic problems resulting from the growth and progress of your city.

The cooperation of you and the other City Officials made our work most pleasant. Your progressive attitude and desire to make necessary corrections are especially appreciated, and the acceptance and endorsement by the Bozeman residents of forward steps previously initiated by you should not pass unnoticed. The City of Bozeman is to be commended for its foresight in acquiring property for off-street parking which solves one problem which is plaguing many other communities.

The Highway Commission will have a continuing interest in the solution of these traffic problems and we will cooperate in every way possible in a program of correction.

Respectfully submitted,

Scott P. Hart

Scott P. Hart
State Highway Engineer

SPH:ctk

ACKNOWLEDGEMENTS

The assistance given by City Manager, M. E. Henderson, Mayor Lowe, the City Commission, and the hundreds of motorists who were inconvenienced while the interviewing was in progress is hereby acknowledged.

Technical data were obtained from published reports of the Bureau of Public Roads, other State Highway Departments, and various traffic agencies.

DEFINITIONS

ORIGIN AND DESTINATION STUDY. A study of the origins and destinations of trips passing out of, into or through a selected area.

CENTRAL BUSINESS DISTRICT. The major business district of a city, also commonly called the *downtown area.*

TRIP. The one-way travel of one vehicle between an origin and a destination.

DESIRE LINE. A straight line between a point of origin and a point of destination without regard for existing routes.

DESIGN VOLUME. A traffic volume determined for use in design representing traffic expected to use the facility. Unless otherwise stated, it is an hourly volume roughly corresponding to the thirtieth highest hour for the year.

POSSIBLE CAPACITY. The maximum number of vehicles that can actually be accommodated by an intersection approach under prevailing conditions with a continual backlog of waiting vehicles.

PRACTICAL CAPACITY. The maximum number of vehicles that can enter an intersection from any approach with most of the drivers being able to clear the intersection without waiting for more than one complete signal cycle.

SURVEY HIGHLIGHTS

The average weekday traffic entering or leaving Bozeman in August 1953 totaled 10,856 vehicles of which 9,795 were passenger cars, pickups or panels and 1,061 were trucks.

3,294 passenger cars and 434 trucks or 34.3 per cent of the total external traffic did not make an essential stop in Bozeman.

A total of 2,388 passenger cars and 217 trucks or 24 per cent of the external traffic had either an origin or destination in the central business district.

Main Street (U. S. 10) will have adequate traffic capacity until at least 1970. North Seventh Avenue at Main Street is now operating at about practical traffic capacity and will be approximately 34 per cent above practical capacity by 1970.

During peak hours traffic was operating on Main Street at 15.6 miles per hour west bound and 13.6 miles per hour east bound. Intersection delay accounted for all of the stopping delays encountered from Rouse to North Seventh Avenues.

RECOMMENDATIONS

TRUCK ROUTES

Results of the external origin and destination survey indicate that there are approximately 1,000 medium and heavy commercial units entering or leaving Bozeman on the main highways each weekday. 732 of these commercial vehicles use all or part of U.S. 10 on Main Street to gain access to the various parts of the city. This condition creates some congestion and a considerable amount of objectionable noise in the business district and school zones on Main Street.

An analysis made of the desire lines of travel reveals that an average of approximately 300 commercial vehicles and 320 through passenger cars could advantageously use a by-pass route between U.S. 10 east and west. It is further estimated that an additional 500 local vehicles could be expected to use the facility which would increase the total average daily traffic to approximately 1,100 vehicles. This volume of traffic is considered ample to justify a by-pass and it is recommended that a by-pass route between U.S. 10 east and west be constructed. Plate 1 illustrates the tentative location of the route that has been selected after a field investigation.

Right-of-way considerations would require the purchase of some vacant property east of Broadway near the proposed junction with U.S. 10. This will provide necessary sight distance at the junction as well as an easier approach to the highway. Broadway has adequate width to accommodate anticipated traffic volumes and should present no special right-of-way problems to the intersection of Front Street. Front Street however, between Broadway and Plum Streets is not open to traffic and it is possible that it has been officially

closed by the city. If this is the case, it will be necessary to purchase and remove two old warehouses which are now blocking the street. Additional right-of-way would be required on a projection of Tamarack Street between Third and Fifth Avenues. This section should not prove too costly however, as the land is now being utilized as pasture. It is strongly recommended that all right-of-way be obtained as quickly as possible to forestall any future building construction.

One possible modification of the proposed location which will be investigated is the extension of Front Street in a southeasterly direction to a junction with U.S. 10 near the east city limits. This modification would provide a more direct connection from U.S. 10 to the principal industrial district adjacent to the Northern Pacific Railway.

RELOCATION OF U.S. 191

For a number of years the relocation of U.S. 191 through Bozeman has been considered due to the poor alignment and inadequate street widths of the present routing. A limited traffic survey of Bozeman in 1948 pointed out some of the inadequacies of the present route and suggested that a new location be investigated which would enter Bozeman on West Main Street and junction with U.S. 10 at North Seventh Avenue.

A recent field investigation indicates that the West Main Street routing for U.S. 191 is still the most feasible location from a right-of-way standpoint and it is recommended that it be constructed as soon as funds are available. Plate 2 illustrates the proposed routing of U.S. 191 from North Seventh Avenue (U.S. 10) in Bozeman to Bozeman Hot Springs.

A minimum of 52 feet of right-of-way can be obtained for the street section on Main Street from North Seventh Avenue to the west city limits without disturbing present property lines. This width should be adequate to handle any traffic volumes in the foreseeable future. From the city limits to

a junction with the present routing of U.S. 191 north of Gallatin Gateway, the proposed alignment traverses highly productive agricultural lands which will prove to be relatively expensive to acquire for right-of-way. It should be cheaper however, to purchase right-of-way for the proposed alignment through open agricultural lands than to attempt to widen the present road through the heavily built up, small acreage tracts near Bozeman.

NORTH SEVENTH AVENUE

The rapid expansion of Bozeman in recent years has been a factor in the location of business establishments along North Seventh Avenue to such an extent that the city has zoned this area as a second commercial district. Problems concerning grades, building offsets, access, etc. have confronted city officials in drafting building ordinances for the new district, because of the fact the Montana Highway Commission and the city of Bozeman jointly own 100 feet of right-of-way from Beall Street to the north city limits and only 30 feet is utilized for roadway. Additional right-of-way on each side of the highway was acquired some years ago for a roadside beautification project which is still maintained.

Traffic on this section of North Seventh Avenue was averaging over 4,500 vehicles per day during August of 1953 with a peak recorded hour of 440 vehicles at the Peach Street intersection. These traffic volumes are now overloading the 22 foot surface of the present 30 foot roadway and it is estimated that they will have increased a minimum of 34 per cent by 1970.

In order to provide for anticipated traffic volumes, it will be necessary that North Seventh Avenue from the city limits to Main Street be reconstructed to a four lane highway standard shown on Plate 3.

The 100 feet of right-of-way from Beall Street to the north city limits can be well utilized by providing four 13 foot traffic lanes, two 9 foot parking lanes, a 12 foot median strip, and two 8 foot sidewalks. This will

allow buildings to be set back one foot from the sidewalk and outside the right-of-way boundary. From Beall Street south to Main Street, a distance of approximately 700 feet, the curb to curb width of North Seventh Avenue narrows to 45 feet. It will therefore be necessary to acquire additional right-of-way to continue a four lane standard to Main Street. It is anticipated that the necessary additional right-of-way will be relatively expensive even at present values, but any undue postponement of the purchase could result in a substantial increase in property values due to the rapid commercial expansion along North Seventh Avenue.

To facilitate orderly building construction along North Seventh Avenue, it is necessary that the State Highway Commission formulate a firm policy regarding the reconstruction of U.S. 10. A substantial grade variation could be very disadvantageous for the business houses that have taken their elevations from the present roadway. For this reason it is recommended that the present elevation of the finished roadway be maintained as closely as practicable when this section is reconstructed.

NORTH ROUSE AVENUE

The Bridger Canyon secondary highway which enters Bozeman on North Rouse Avenue taps the northeastern part of Gallatin County and serves a large area devoted to farming, livestock, and dude ranch operations.

Construction on this route began at the north city limits of Bozeman in 1936 and has progressed northeasterly for a distance of about 18 miles. Traffic has increased with the construction until the annual average daily volume entering the city on Rouse Avenue is now approaching 500 vehicles per day.

Inasmuch as this route is nearing completion and Rouse Avenue is still unimproved, it is recommended that the section from the north city limits of Bozeman to Main Street be given an early construction priority.

ISOLATED INTERSECTION TREATMENT

BABCOCK STREET AND WILLSON AVENUE

Traffic at the intersection of Babcock Street and Willson Avenue is now controlled by four way stop signs. This treatment distributes right-of-way equally to each street, but it also forces every vehicle to come to a complete stop before entering the intersection and thus slows down the orderly movement of traffic during peak hours. During off-peak hours, traffic on the major artery has a tendency to disregard the stop signs due to the light traffic on the minor street.

Most traffic authorities are agreed that if traffic is heavy enough at an intersection to warrant four way stop signs, consideration should be given to installing traffic signals. Minimum vehicular volume warrants for signal installation at a normal four way urban intersection are as follows:

1. Total vehicular volume entering the intersection from all approaches must average at least 750 vehicles per hour for any 8 hours of an average day; and
2. Total vehicular volume entering the intersection from the minor street must average at least 175 vehicles per hour during the same 8 hours.

Recorded traffic volumes entering this intersection from all directions averaged 604 vehicles per hour during the hours from 10 A.M. - 6 P.M. with a peak hour of 822 vehicles between 4:30 and 5:30 P.M. These hourly volumes are slightly less than the recommended minimum warrants for signalization but due to the almost equal distribution of traffic on the two arterials, it is recommended that a fixed time signal be placed in operation at this location. A 55 second signal cycle equally split should handle the traffic more efficiently than the present four way stop signs.

TRACY AVENUE AND PEACH STREET

Some consideration has been given by city officials to establishing a four way stop at the Tracy Avenue and Peach Street intersection. Directional volume counts made at this location indicate that the total traffic entering the intersection from all directions does not exceed 100 vehicles during any one hour between 10 A.M. and 6 P.M. The present warning signs in place at this intersection are considered adequate and four way stop signs are not recommended at this time.

WALLACE AVENUE AND MENDENHALL STREET

Directional traffic counts taken at this location indicate hourly volumes entering the intersection vary between the limits of 238 and 340 vehicles with the peak hour occurring between 4:30 and 5:30 P.M. A heavy movement of traffic between North Wallace Avenue and West Mendenhall Street is quite consistent throughout the day with a comparatively light volume on East Mendenhall. Present controls stop both north and south bound traffic on Wallace Avenue while allowing vehicles to proceed through the intersection on Mendenhall. In view of the heavy north to west movement of traffic through the intersection, it is suggested that the stop sign on the north leg of Wallace Avenue be moved to the east leg of Mendenhall Street. This will reduce the number of vehicles that are forced to stop from 52 per cent to 33 per cent of those entering the intersection.

TRACY AVENUE AND MENDENHALL STREET

Traffic at the intersection of Tracy Avenue and Mendenhall Street is controlled by stopping north and south bound traffic on Tracy Avenue. Directional counts indicate that this is the proper procedure as Mendenhall Street is carrying traffic volumes that are over 2½ times heavier than those on Tracy Avenue. It is not anticipated that any further traffic controls will be required at this intersection.

SEVENTH AVENUE AND MAIN STREET

Signalization of this intersection was recommended in a separate preliminary report to the city officials and a span mounted overhead signal has been installed. As a means of improving the traffic flow through the intersection, it is suggested that right turns be permitted after a stop for the red light on both Main Street and North Seventh Avenue.

ARTERIAL STREETS

Bozeman's present system of arterial streets appears to be adequate to handle present traffic volumes. The flow of traffic between the college area and the business district has not yet reached such proportions that an additional arterial is necessary. It is suggested that South Eighth Avenue be retained as a north - south arterial from Main Street to College Street after U.S. 191 is relocated on West Main Street.

It has been suggested that Peach Street from North Seventh Avenue to Wallace Avenue be designated as an east - west arterial. Traffic counts taken at various intersections on Peach Street indicate that the volume now using the street does not justify arterial operation. Preferential treatment should be accorded to Tamarack Street in this area at all intersections with the exception of North Seventh and Rouse Avenues if it is improved and designated as a through truck route.

PARKING

The city of Bozeman is to be commended for its foresight in acquiring property for off-street parking lots. Five municipally owned lots all within

two blocks of Main Street provide off-street parking space for about 350 vehicles through the courtesy of the city of Bozeman. This situation of adequate free parking within a reasonable distance of the business district is unique in cities of over 10,000 population and it is estimated that Bozeman should not experience any critical parking problems for the next 15 years.

A large super market and customer parking lot is located on Mendenhall Street between North Grand and North Third Avenues. Curb parking on both sides of the comparatively narrow Mendenhall Street is hampering the use of the parking lot and is creating a considerable amount of congestion adjacent to the super market. As a corrective measure, it is suggested that interfering curb parking be prohibited on the south side of Mendenhall Street between Grand and Third Avenues during the hours of 8 A.M. - 10 P.M.

STOP SIGNS

General observation indicates that there are some stop signs in the central business district mounted too low on streets where parking is permitted. The manual on Uniform Traffic Control Devices recommends that in urban areas and at any location where parked vehicles may obscure the stop sign, the sign shall be mounted so that its lower edge will be seven feet above the top of the curb. It is therefore suggested that those signs which are mounted lower than seven feet be raised to this minimum.

BOZEMAN TRAFFIC SURVEY
PROPOSED LOCATION OF
TRUCK BY PASS

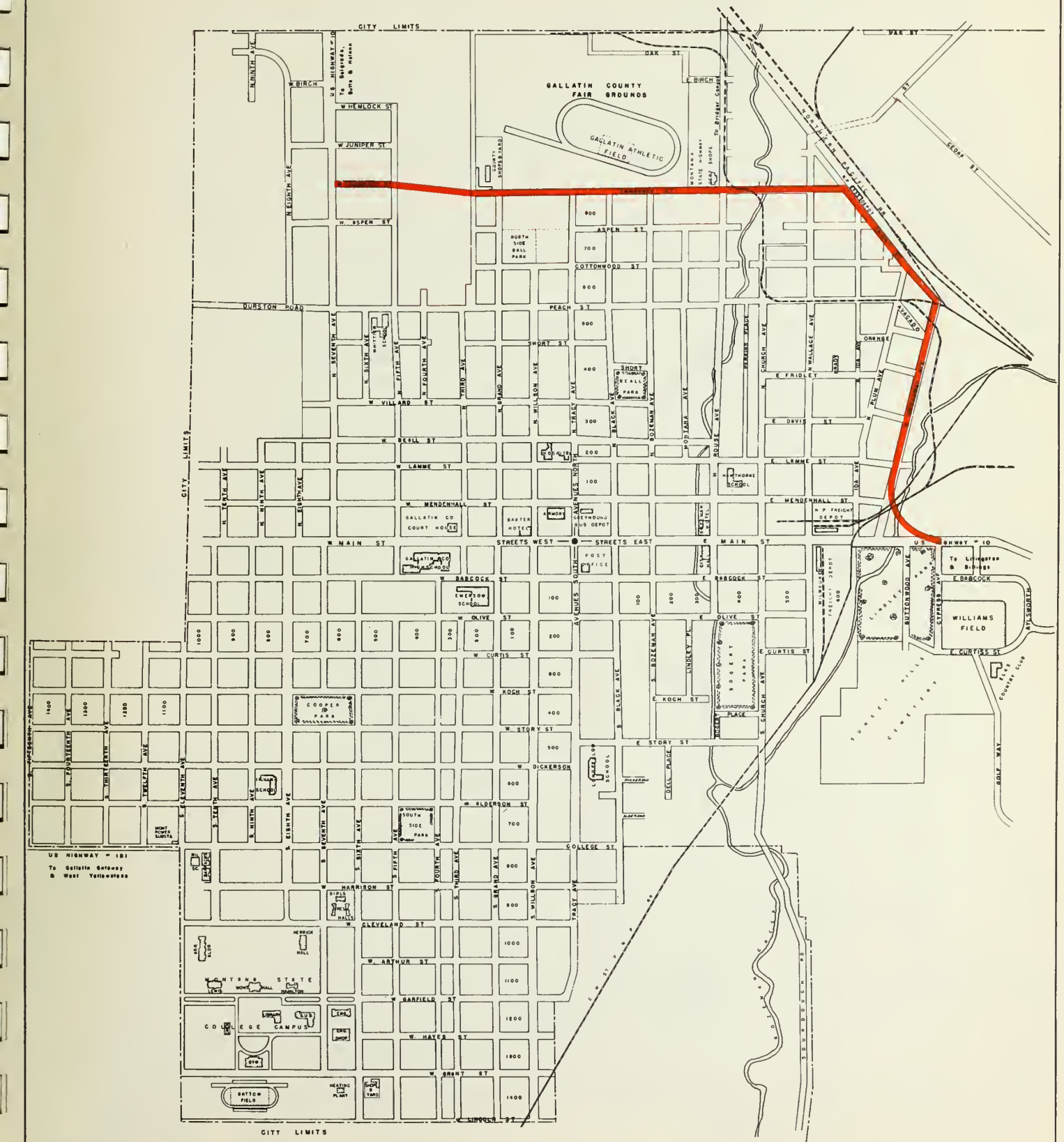
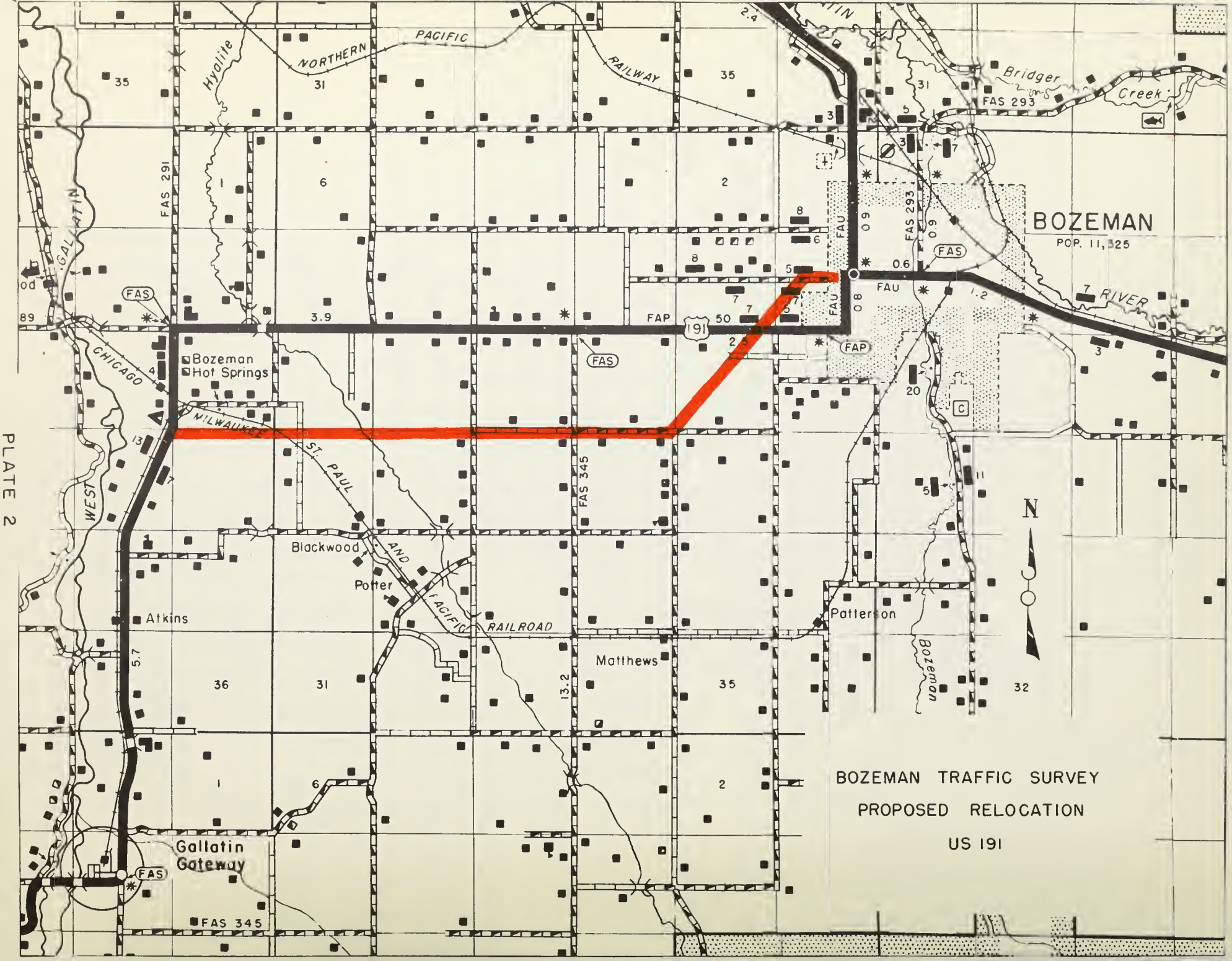


PLATE 1


PACIFIC
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GALLATIN
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FAP
191
RIVER
Bozeman
Hot Springs
CHICAGO
MILWAUKEE
ST. PAUL
AND
PACIFIC
RAILROAD
WEST
FAS 345
Blackwood
Potter
Atkins
Matthews
Patterson
Bozeman
Gallatin
Gateway
N
BOZEMAN TRAFFIC SURVEY
PROPOSED RELOCATION
US 191

PLATE 2

BOZEMAN TRAFFIC SURVEY
PROPOSED STANDARD
NORTH SEVENTH AVE-US10

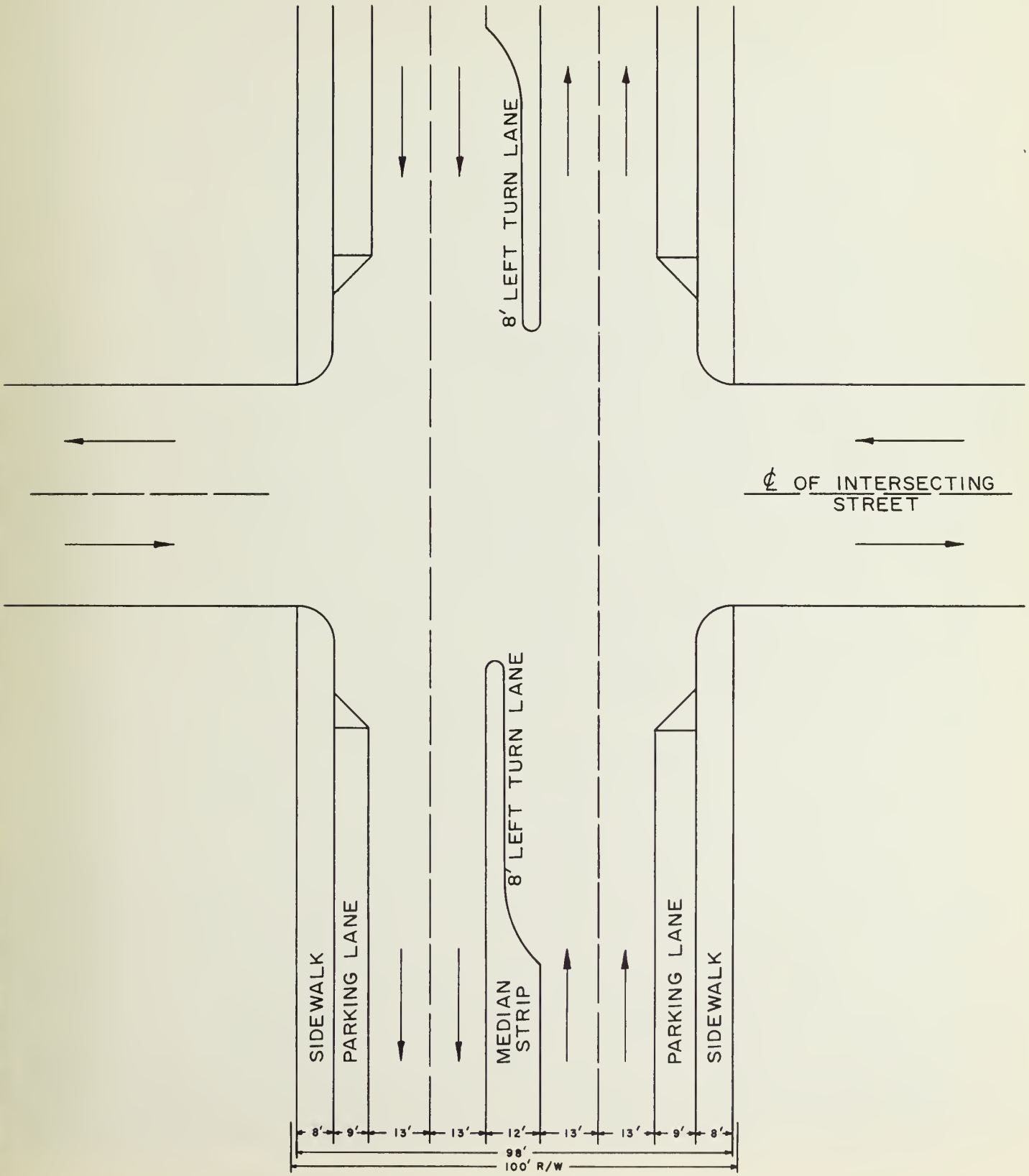
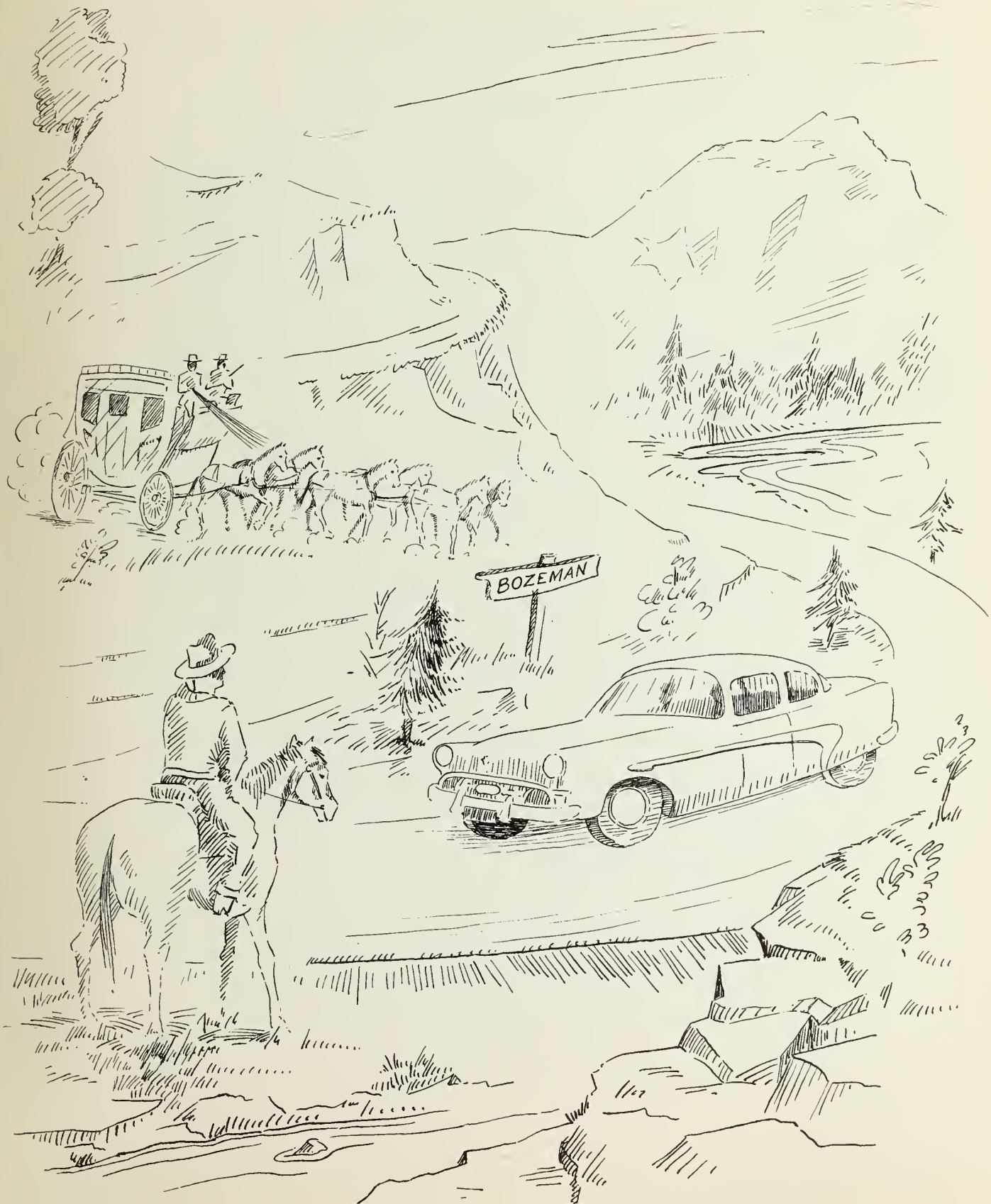


PLATE 3

BOZEMAN

Introduction



INTRODUCTION

GENERAL CHARACTERISTICS

Bozeman, the county seat of Gallatin County had a 1950 population of 11,325. The city is located in the fertile Gallatin River Valley near the center of one of the best areas in the State for irrigated and dry land farming. The valley has a mean elevation of about 4,500 feet with surrounding mountain peaks rising to over 11,000 feet above sea level. Since it was originally located as a stopover for wagon trains along the old Bozeman Trail, the city's colorful history has been characterized by steady progress based almost entirely on an agricultural economy.

The main business district is confined principally to Main Street, but in recent years several business establishments have located along North Seventh Avenue. To the south of Main Street are situated some of the better residential districts, the Campus of the State College of Engineering and Agriculture, and a small industrial district along the Milwaukee Railway. The north side of the city consists of residential property, the Gallatin County Fair Grounds and the main industrial district adjacent to the Northern Pacific Railway.

Provisions were made in the original townsite for a comparatively wide main street, but almost all other streets and avenues are narrow by present standards. Numerous parks, playgrounds, and a large swimming pool attest to the foresight of the city founders.

HISTORY

Members of the Lewis and Clark expedition are generally credited with being the first white men to enter the area that is now known as Gallatin County. This party of explorers arrived at the Three Forks of the Missouri River July 25, 1805. John Colter and John Potts, members of the original Lewis and Clark expedition, returned to the Gallatin Valley in 1808 to notify the Blackfeet Indians that a fur trading post had been established at the mouth of the Big Horn River. On this trip Potts was killed by hostile Indians in the vicinity of Three Forks and Colter made his almost legendary escape after being set afoot by the Indians without clothing or food.

Occasional trappers and missionaries passed through the territory during the years from 1808-1862, but it was not until 1863 that the mining activity at Virginia City and Bannack spurred men to look for a shorter route from the gold mines to the States.

In the winter of 1862-1863 John M. Bozeman and John Jacobs left Bannack for St. Louis for the purpose of locating a shorter wagon road for immigrants and supplies than the roundabout route of the Oregon Trail. The wagon road that was finally located left the Oregon Trail on the upper Platte River in Wyoming to swing north into Montana along much of the present alignment of U.S. 87 to the Yellowstone River. It then followed the river to the present site of Livingston, thence over the Bozeman Pass into the Gallatin Valley and on to the mining camps of Virginia City and Bannack.

As travel increased over the Bozeman Trail between the mining camps and civilization, more and more people were attracted to the agricultural possibilities of the Gallatin Valley. Primitive irrigation systems were constructed and a ready market was found for all produce in the near-by mining camps.

In 1864, while John Bozeman was still engaged in guiding numerous wagon trains over the trail that he had established, his friends Daniel Rouse and William J. Beall were busy constructing buildings on a townsite which was

later to bear his name.

The Blackfeet Indians began to contest the land rights of these early settlers and as a result of numerous Indian raids, the United States Army established Fort Ellis about three miles east of Bozeman. By 1870 the Indian threat had largely died down and the frontier outpost had grown to a sizeable town.

The building of the Northern Pacific Railway through Bozeman in 1883 added new impetus to the permanent settlement of the city and the surrounding area. One year later, articles of incorporation were approved by the Territorial Legislature which permitted the residents of Bozeman to organize a city government and to define the boundaries of the townsite. The population of the city at this time was approximately 800.

The next decade in the city's history was marked by constant expansion. New business enterprises were established, residential construction reached new highs and the Montana State College of Engineering and Agriculture was created by an act of the 1893 legislature. This college, which is a branch of the greater Montana University system, operates an agricultural experimental farm that has done much to further agriculture in Montana and stabilize the economy of Bozeman.

The ensuing years have brought prosperity and a steady growth to Bozeman until today it is ranked as one of the State's leading cities.

INDUSTRY AND COMMERCE

Bozeman is the trading center of one of the most highly developed agricultural areas in Montana. As such, its industry and commerce are devoted primarily to serving the agricultural and livestock interests in the surrounding territory. A pea cannery, flour mills, and a livestock sales yard are some of the major industries located here.

Due to its location on U.S. 10 and U.S. 191 one of the main highways to

Yellowstone National Park, the tourist business is fast becoming one of the more important industries of Bozeman. Several modern motels, cafes, and curio shops attest to its importance.

In recent years the processing of forest products, particularly utility poles and pulpwood, has become an important factor in the community's economy and in 1952 a new sawmill was constructed which has an annual production of 25 million board feet of lumber.

The State College of Bozeman with a present enrollment of about 2,000 students has contributed greatly to the stability and culture of the community and the expanded construction program of badly needed buildings on the campus has provided additional pay rolls.

TRANSPORTATION

Bozeman is served by U.S. 10, Montana's heaviest traveled transcontinental highway, and by U.S. 191 which links the city to Yellowstone National Park via the scenic West Gallatin Canyon. An excellent system of County and State secondary highways provides ready access to Bozeman from the farms and ranches in the area.

The main line of the Northern Pacific Railway provides service to the city from the east and west and the Milwaukee Railway operates a branch line to Bozeman from its main line at Three Forks.

Northwest Airlines provides passenger and Air Mail service from a modern airport west of the city. Charter plane service for passengers is also available at the local airport.

Excellent daily bus service is furnished by the Greyhound Lines and numerous truck lines, both local and interstate, serve the entire area.

TRAFFIC PROBLEMS

Bozeman's Main Street developed along a wagon road which was destined to become U.S. 10 -- one of Montana's most important transcontinental highways Due to the foresight of the city's founders, the original street width has proven to be adequate to handle the ever increasing volume of traffic up to the present time. The sharp increase in the use, as well as in the size, of heavy commercial vehicles during recent years has created some traffic problems in Bozeman that are common to many of our larger cities.

At present a comparatively large volume of heavy commercial traffic cannot avoid traveling the entire length of Main Street through Bozeman. This condition causes excess noise and a considerable amount of confusion in the central business district. As the main portion of the warehouse district is located along the Northern Pacific Railway tracks north of Main Street, some consideration has been given to routing trucks through the city in this general area for a number of years.

U.S. 191 enters Bozeman from the west on College Street, turns 90 degrees to the north at South Eighth Avenue, then 90 degrees to the east at Main Street to junction with U.S. 10 at North Seventh Avenue. In addition to the poor alignment, the present routing passes the campus of the Montana State College and utilizes streets originally designed for residential traffic. South Eighth Avenue is divided into two twenty foot lanes by a curbed median strip 20 feet wide. Parking is allowed on each side of the avenue which reduces the effective width of each lane to less than 12 feet.

During the college term considerable local traffic uses Eighth Avenue between the College and Main Street in addition to the traffic entering the city on U.S. 191. The combination of these two volumes has now reached a total of over 5,500 vehicles per day between College and Main Street and is badly overloading and congesting South Eighth Avenue.

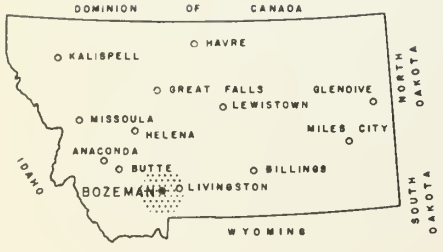
The relocation of U.S. 191 and the relative need for a truck by-pass are considered to be the most important traffic problems in Bozeman. It was realized, however, that there were other traffic situations in the city that required field investigation, consequently a traffic survey was planned which would cover Bozeman's more pressing traffic problems.

THE SURVEY

An external origin and destination survey was taken on all main highways during August of 1953 to determine the need for a truck by-pass and to aid in the relocation of U.S. 191.

It will be noted that the recommendations as a result of this study, are in general, very similar to those proposed in the 1948 limited Traffic Survey of Bozeman. A comparison of the basic data of the two studies is quite interesting. Traffic entering the city on the three major highways has more than doubled in the intervening five year period between the two surveys; but the change in the origin and destination of this traffic has not followed the same ratio. Traffic through these entrances that is bound for the central business district has increased approximately one third in that period while through traffic has nearly tripled. This change further emphasizes the need for by-pass facilities in Bozeman.

Speed and delay studies were conducted on Main Street to determine the amount of existing congestion and 8 hour turning movement counts were taken at all the more important street intersections throughout the city to develop a traffic flow.



DIAGRAMMATIC MAP
OF
MONTANA

BOZEMAN TRAFFIC SURVEY

VICINITY MAP

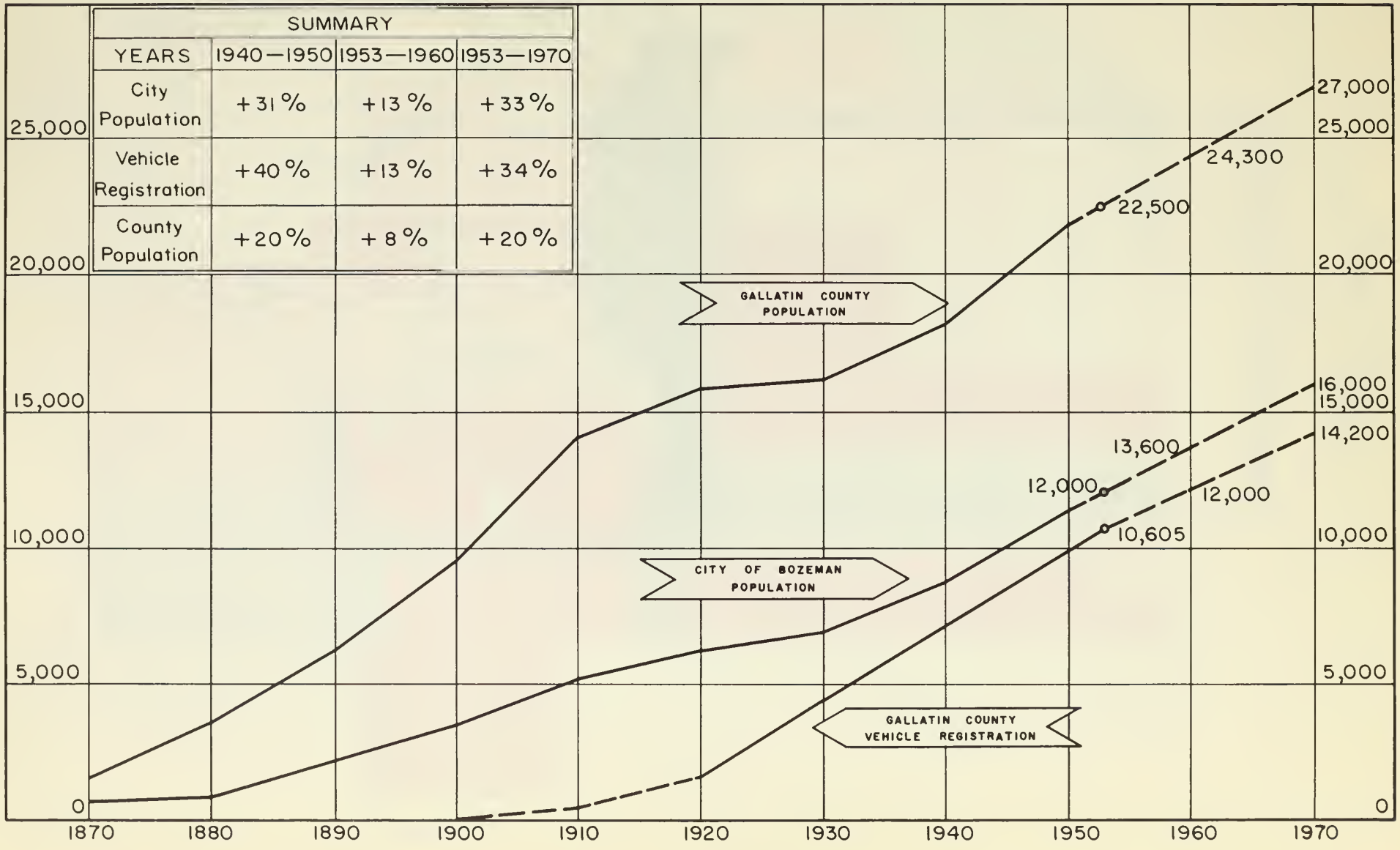
PLATE 4

BOZEMAN TRAFFIC SURVEY

POPULATION AND MOTOR VEHICLE TRENDS

BOZEMAN AND GALLATIN COUNTY

PLATE 5



BOZEMAN TRAFFIC SURVEY

LAND USE

1953

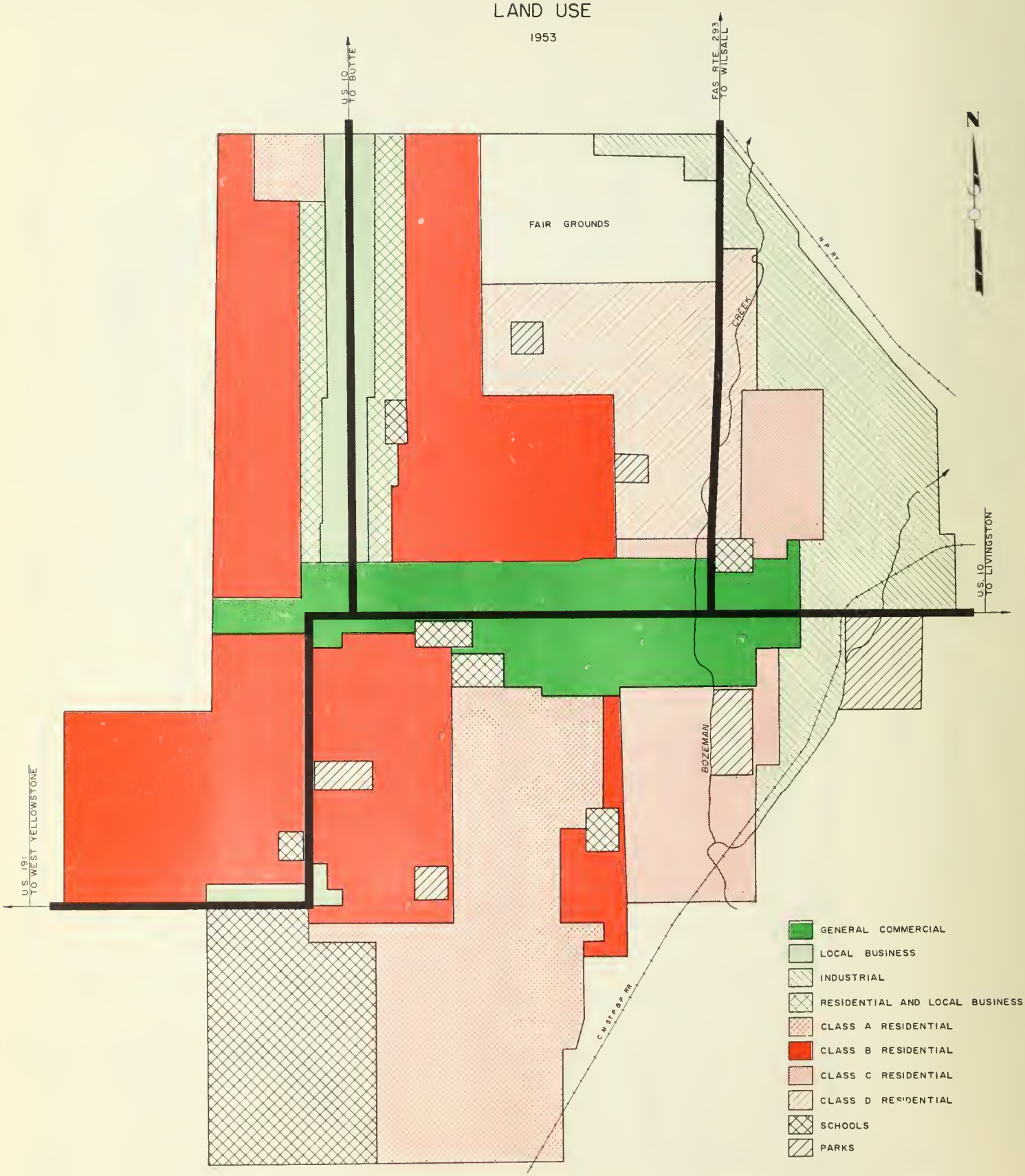
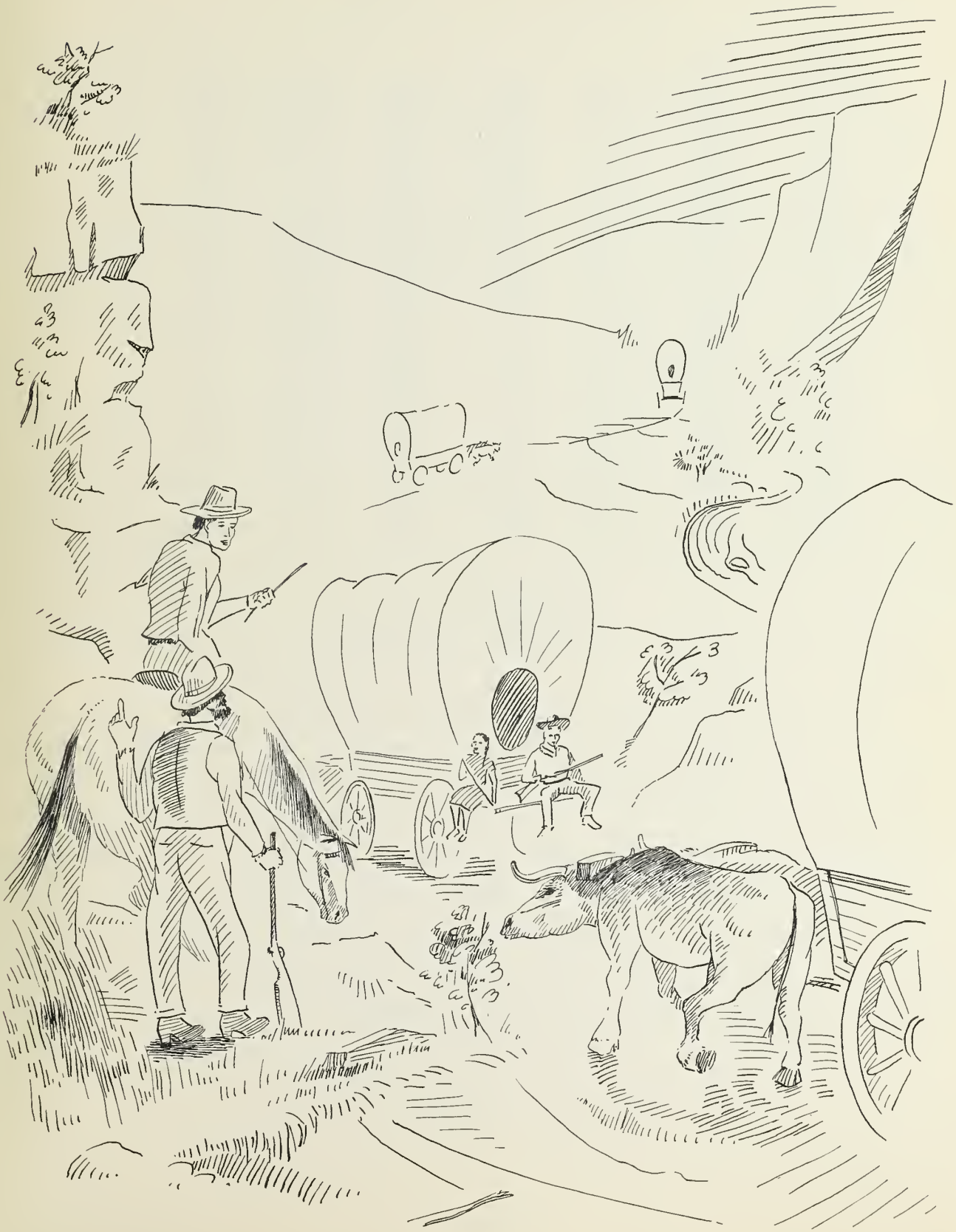


PLATE 6

Part One

Traffic Volumes



TRAFFIC VOLUMES

Most traffic analyses require that adequate data be available concerning the traffic patterns of the area or community being studied. Many problems require a variety of traffic data to aid in their proper solution.

In addition to the traffic counts that were necessary in the expansion of the origin and destination data, 8 hour manual turning movement counts were made at the more important street intersections in Bozeman between the hours of 10 A.M. and 6 P.M. These counts were used in developing the peak hour traffic flow map shown on Plate 9. They were also used as the basic data in the street capacity studies which were made on Main Street.

One traffic station was operated continuously on Main Street during the week of August 10-17 to provide an hourly as well as a daily traffic pattern. Charts on Plates 7 and 8 graphically present these data. It is interesting to note that traffic on Main Street reaches its highest peak on weekdays between the hours of 8-9 P.M. This can be attributed to some extent to the relative lack of industrialization in Bozeman and the consequent lack of the rush of traffic between industrial plants and the residential districts during the usual hours of 4-6 P.M.

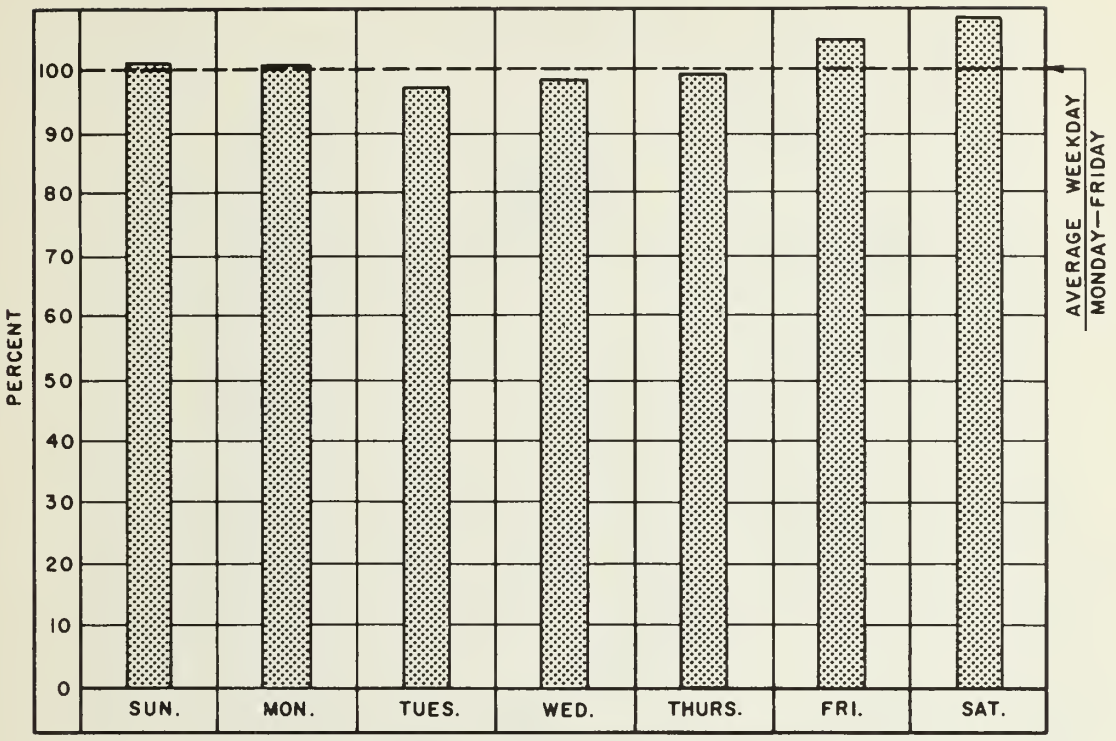
The master station on Main Street was counted by machines that could only print the accumulation of traffic between even hours, but the manual counts taken at major intersections were tabulated by 15 minute intervals. A further analysis made of the manual counts revealed that the hour between 4:30 and 5:30 P.M. was nearly as high as the peak hour between 8-9 P.M. Consequently it was decided to use the 4:30 - 5:30 P.M. volume to plot the hourly traffic flow for the city as it is believed that this hour will be a more consistent peak hour throughout the year. Plate 9 has been prepared to show peak hourly traffic volumes on the principal streets of Bozeman.

BOZEMAN TRAFFIC SURVEY

DAILY VARIATION AND HOURLY PERCENTAGE

MAIN STREET

AUGUST 10—17, 1953



HOURLY PERCENTAGE
AVERAGE WEEKDAY

HOURS A.M.	PERCENT	HOURS P.M.	PERCENT
12—1	2.3	12—1	6.5
1—2	1.6	1—2	6.2
2—3	0.9	2—3	5.6
3—4	0.7	3—4	5.7
4—5	0.6	4—5	6.0
5—6	0.8	5—6	6.7
6—7	1.4	6—7	4.6
7—8	2.9	7—8	5.9
8—9	4.5	8—9	7.2
9—10	5.0	9—10	5.8
10—11	5.2	10—11	4.4
11—12	5.8	11—12	3.7

BOZEMAN TRAFFIC SURVEY

HOURLY TRAFFIC VOLUME PATTERNS

MAIN STREET

AUGUST 10-17 1953

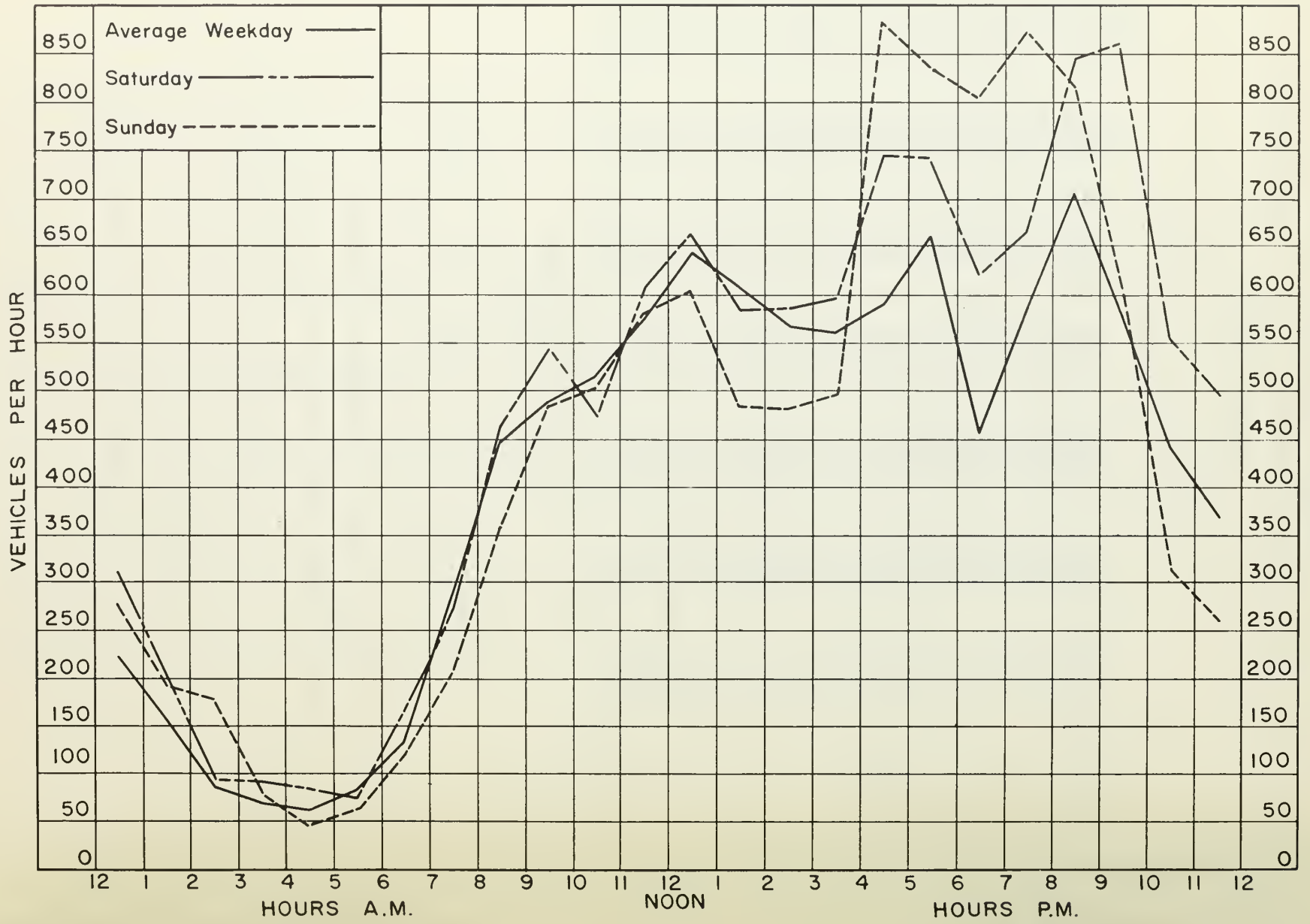


PLATE 8

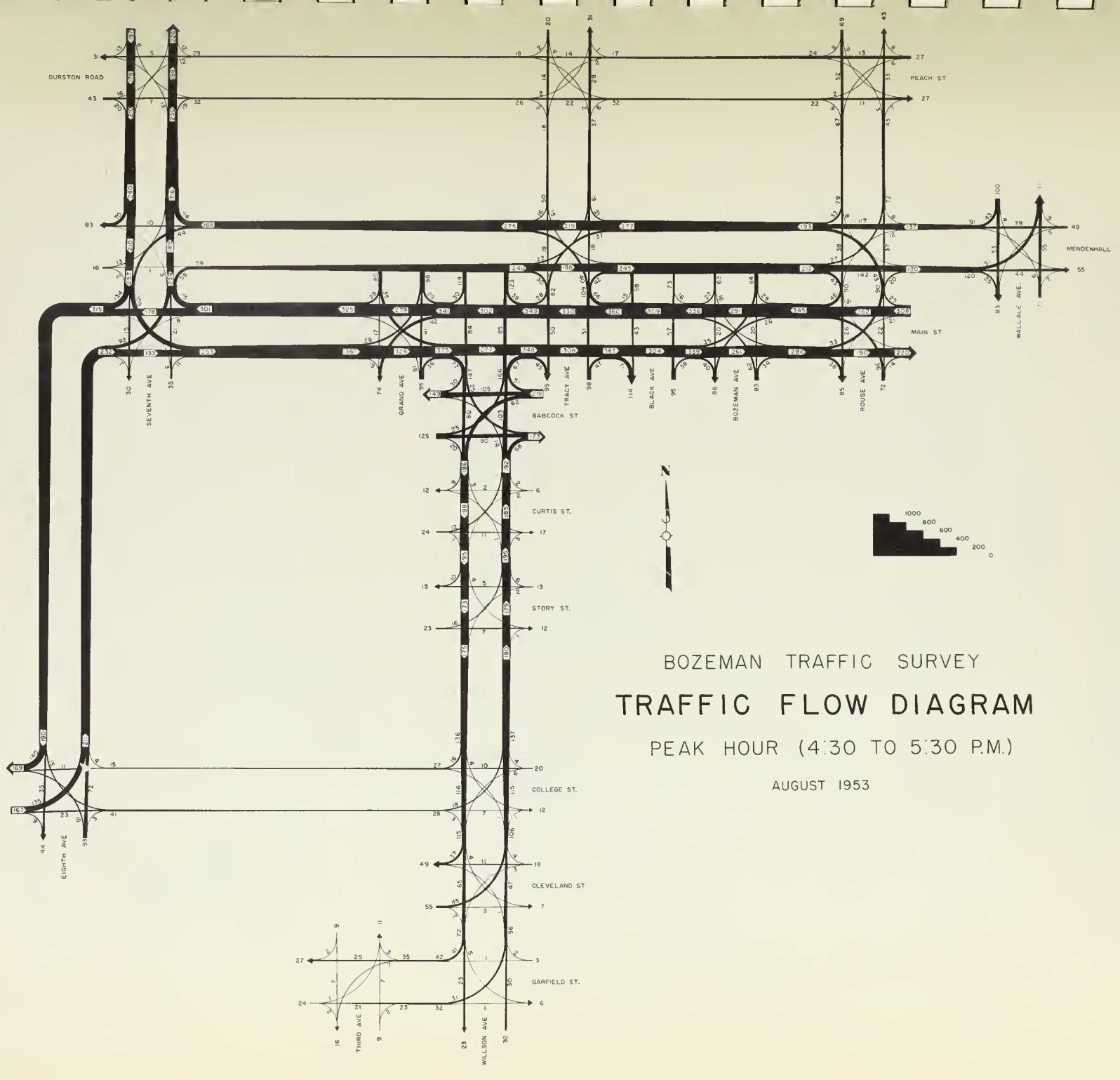


PLATE 9

BOZEMAN TRAFFIC SURVEY

TRAFFIC FLOW DIAGRAM

PEAK HOUR (4:30 TO 5:30 P.M.)

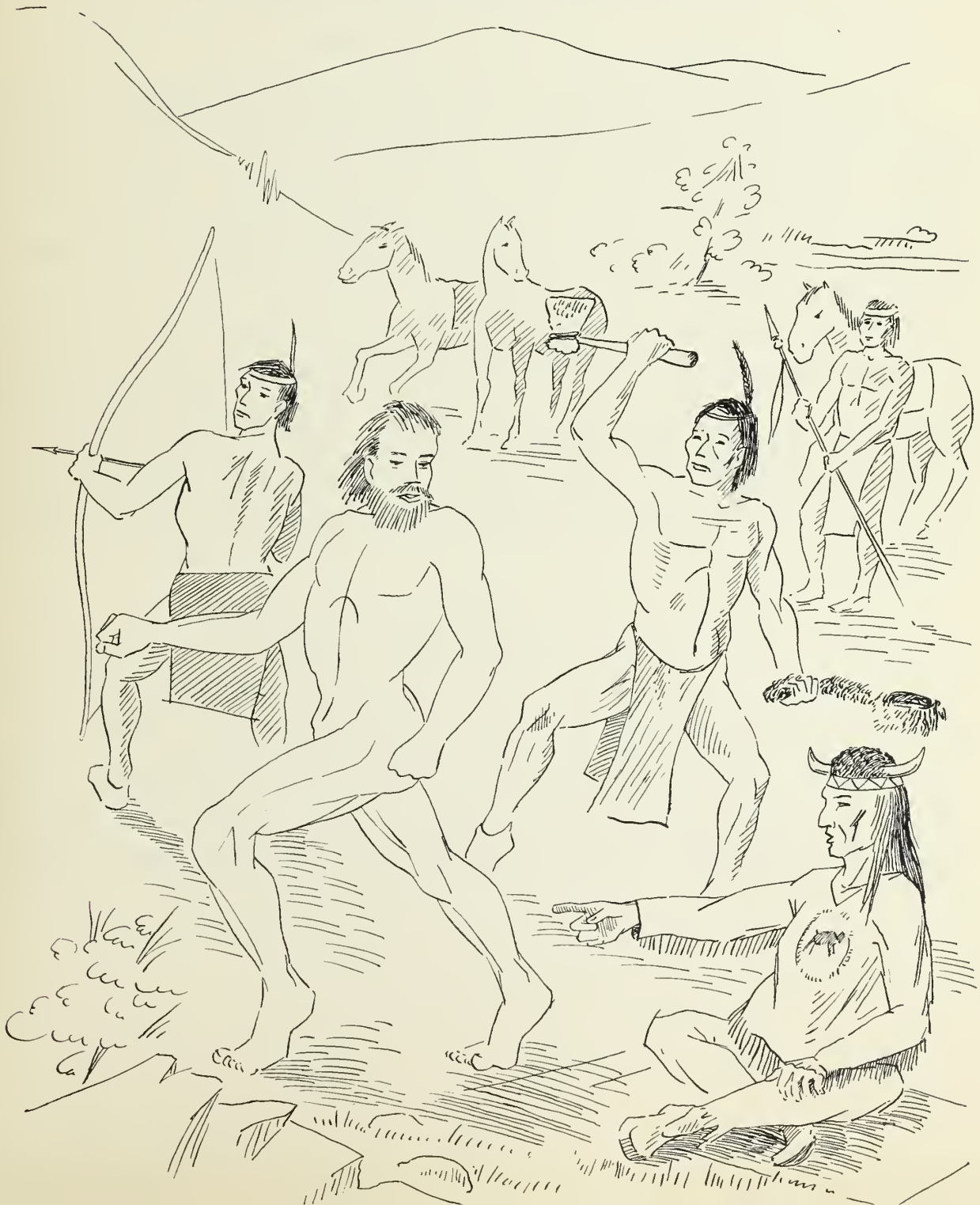
AUGUST 1953

Part Two

Speed and Delay Studies

and

Urban Route Analyses



SPEED AND DELAY STUDIES
AND
URBAN ROUTE ANALYSES

SPEED AND DELAY STUDIES

A series of speed and delay studies were conducted on Bozeman's Main Street between Rouse and North Seventh Avenues during both peak and off-peak hours. The purpose of these studies was to determine the amount, cause, location, and duration of traffic delays as well as overall vehicular speeds. Peak hour observations were made between 4:30 and 5:30 P.M. and off-peak between 10 and 11 A.M.

The field observations were made by using a passenger car to float with the traffic for at least five runs in each direction during both peak and off-peak hours. Any delay that reduced travel speed to under five miles per hour was timed, classified, and recorded. The time required to travel between intersections was also recorded in order that average speeds could be computed. Plates 10, 11, and 12 graphically illustrate the results of these studies on Main Street.

The city of Bozeman is to be commended for changing from angle to parallel parking in July of 1953. This change has eliminated practically all of the mid-block delays which were formerly caused by parking maneuvers as well as most of the general congestion that was apparent before the change. Vehicles now are maintaining average overall speeds during peak hours of 15.6 miles per hour westbound and 13.6 miles per hour eastbound. Waiting for signal changes accounted for over 95 per cent of the total delays in westbound

travel and 100 per cent of the total delays in eastbound travel. This condition can be corrected to some extent by adjusting the signal timing.

The present 60 second cycle is considered too long for simple four-way intersections on an urban street. A reduction in the cycle length to 55 seconds should result in less delays for traffic entering the intersections from the side streets and should also reduce signal delay on Main Street.

A time-space diagram for progressive signal timing is shown on Plate 13. It will be noted that this timing will provide a 16.5 second through band in both directions at approximately 20 miles per hour. The distance between signals at North Seventh and Willson Avenues is considered too great to keep traffic grouped into platoons which is desirable for efficient signal operation. None of the intersecting streets between these two existing signals, however, warrants signalization and it is not recommended that additional signals be installed at this time.

Every signal timing plan should be tested as to its workability and efficiency immediately after it is put into effect. After initial operation, observations should be made for any necessary adjustments in timing to cover local conditions.

URBAN ROUTE ANALYSES

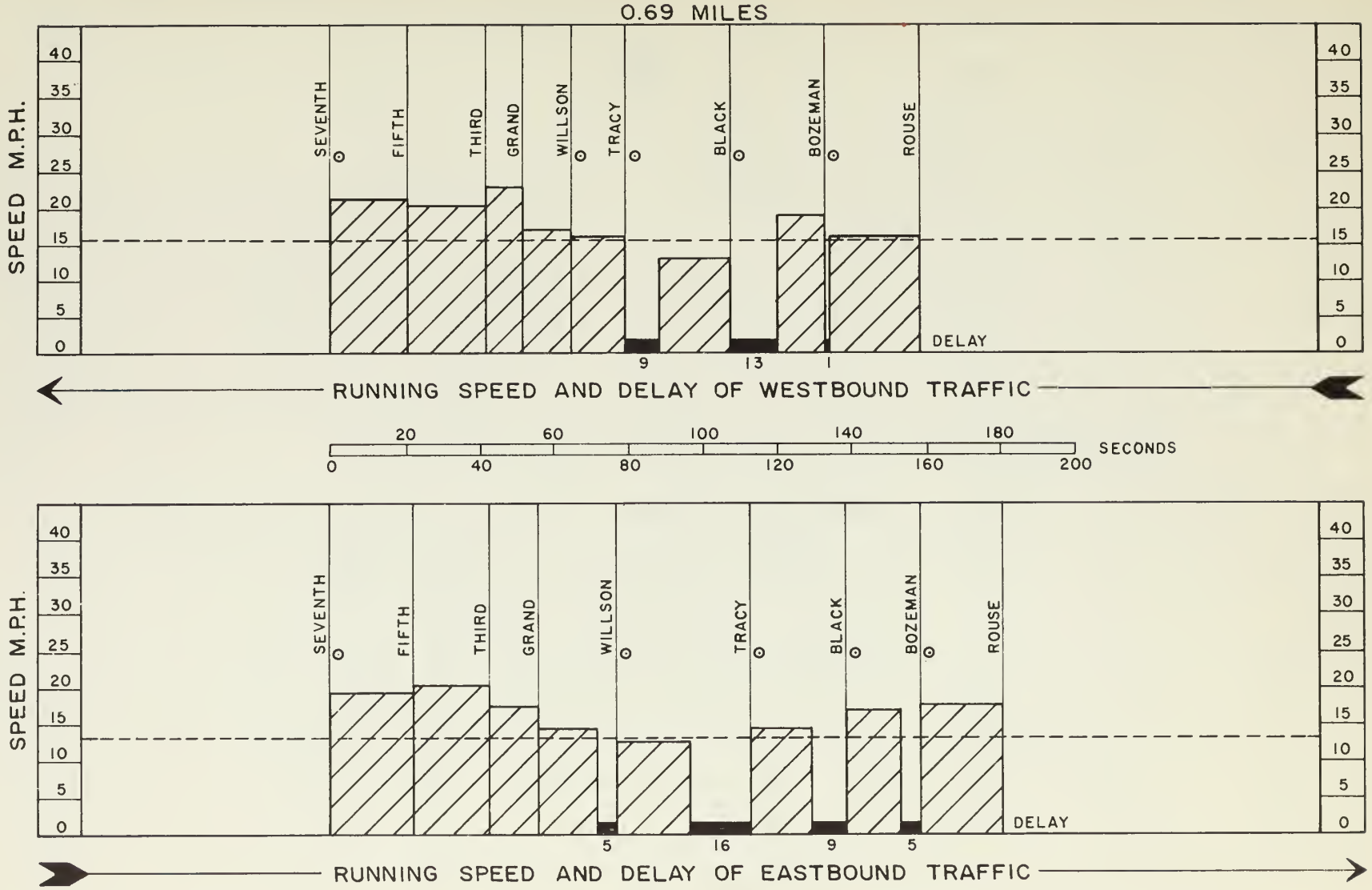
The urban route analysis of Main Street illustrated on Plate 14 consists basically of a study of intersection capacities along the route and the various factors relating to traffic capacity such as street width, turning movements, commercial vehicles, etc. The methods used in determining traffic capacity are detailed in the Highway Capacity Manual published by the Bureau of Public Roads. Traffic volumes used are weekday peak hour volumes which

have been adjusted to a design hour volume corresponding to the thirtieth maximum hour. Accident data were obtained from the City Police Department files covering the 1953 calendar year. A change was made from angle to parallel parking in July of 1953, consequently these data reflect approximately six months of angle and six months of parallel parking. In this connection it is interesting to note that total accidents have decreased 13 per cent since parallel parking was established.

A comparison is made on Plate 14 between the computed critical approach capacities and the estimated design volumes for 1953. The hatched area between the two hourly traffic volumes represents reserve traffic capacity. It is estimated that this reserve capacity will be adequate to handle the normal increase in traffic until at least 1970.

Traffic capacity computations were made on North Seventh Avenue at the intersection with Main Street. The results of these computations indicate that North Seventh Avenue at Main Street is now operating at about practical traffic capacity. This is due primarily to the narrow width of 45 feet and the heavy turning movements at the intersection. Unless additional street width is provided, North Seventh Avenue will be operating at approximately 35 per cent above practical traffic capacity by 1970.

BOZEMAN TRAFFIC SURVEY
PEAK HOUR SPEED AND DELAY
MAIN STREET BETWEEN SEVENTH AND ROUSE AVENUES



AVERAGE RUNNING SPEED

AVERAGE OVERALL SPEED

AVERAGE STOPPING DELAY
2 SECONDS

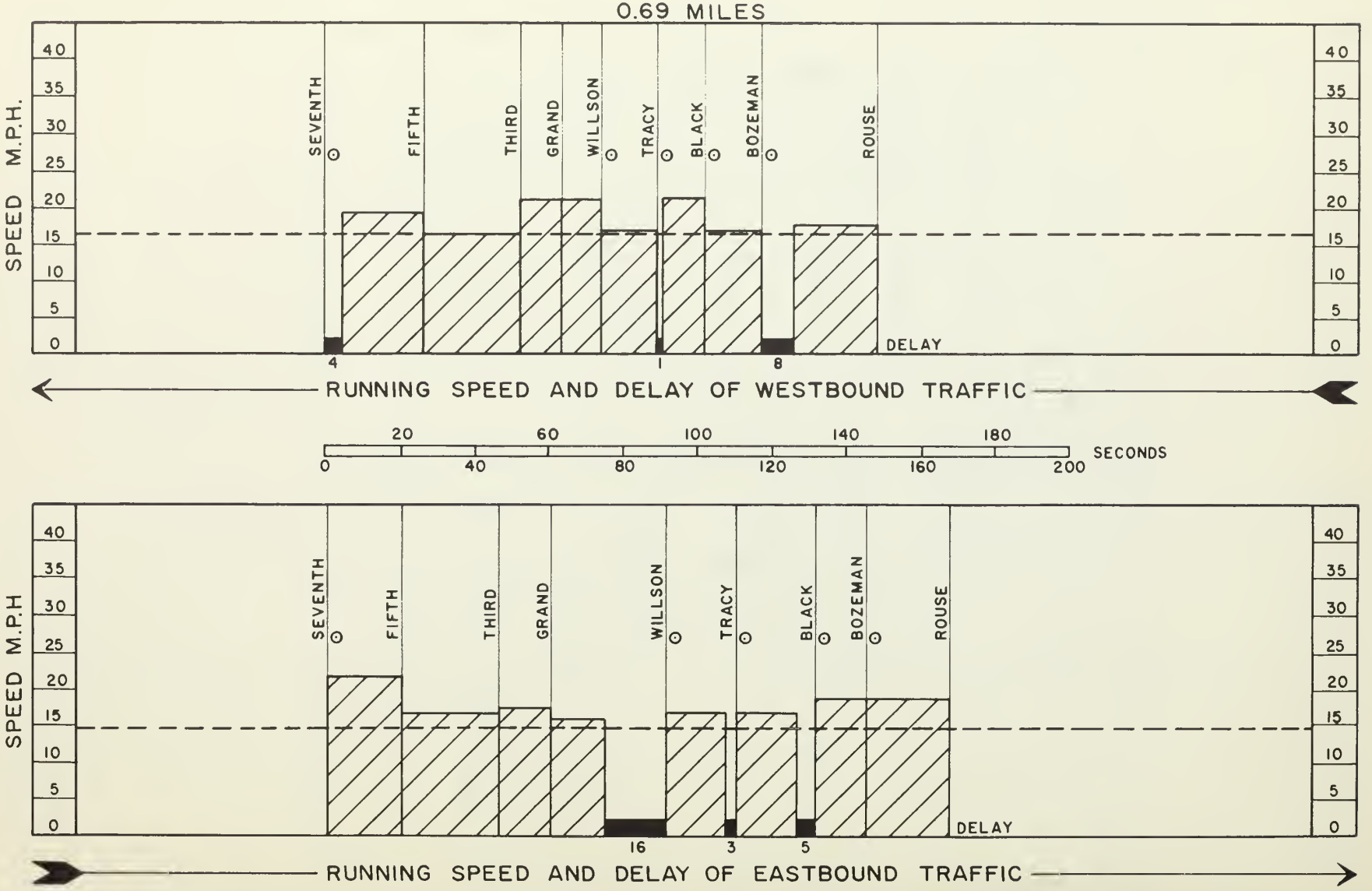
⊙ SIGNALS

SUMMARY OF PEAK HOUR

	WESTBOUND	EASTBOUND
TOTAL RUNNING TIME	2 MIN. 15 SEC.	2 MIN. 26 SEC.
TOTAL STOPPING DELAY	23 SEC.	35 SEC.
AVERAGE OVERALL SPEED	15.6 M.P.H.	13.6 M.P.H.

PLATE 10

BOZEMAN TRAFFIC SURVEY
OFF PEAK HOUR SPEED AND DELAY
MAIN STREET BETWEEN SEVENTH AND ROUSE AVENUES



AVERAGE RUNNING SPEED

AVERAGE OVERALL SPEED

AVERAGE STOPPING DELAY

2 SECONDS

⊙ SIGNALS

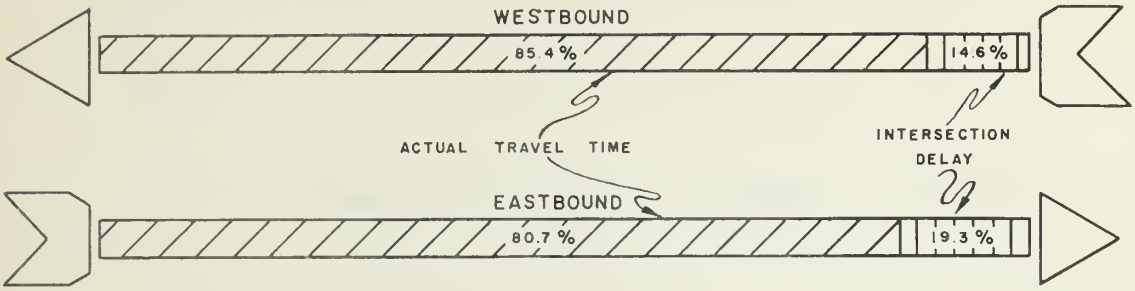
SUMMARY OF OFF PEAK HOUR

	WESTBOUND	EASTBOUND
TOTAL RUNNING TIME	1 MIN. 15 SEC.	1 MIN. 23 SEC.
TOTAL STOPPING DELAY	13 SEC.	24 SEC.
AVERAGE OVERALL SPEED	16.7 M.P.H.	14.8 M.P.H.

PLATE 11

BOZEMAN TRAFFIC SURVEY
PEAK HOUR — DELAY ANALYSIS
MAIN STREET BETWEEN SEVENTH AND ROUSE AVENUES

PEAK HOUR
PER CENT TRAVEL TIME



	PEAK HOUR		OFF PEAK HOUR	
	WESTBOUND	EASTBOUND	WESTBOUND	EASTBOUND
AVERAGE OVERALL DRIVING TIME	2 MIN. 38 SEC.	3 MIN.. 1 SEC.	2 MIN. 28 SEC.	2 MIN. 47 SEC.
AVERAGE OVERALL SPEED	15.6 M.P.H	13.6 M.P.H.	16.7 M.P.H.	14.8 M.P.H.
AVERAGE TRAVELING SPEED	18.3 M.P.H	16.9 M.P.H.	18.3 M.P.H.	17.3 M.P.H.

PEAK HOUR
PER CENT DELAY

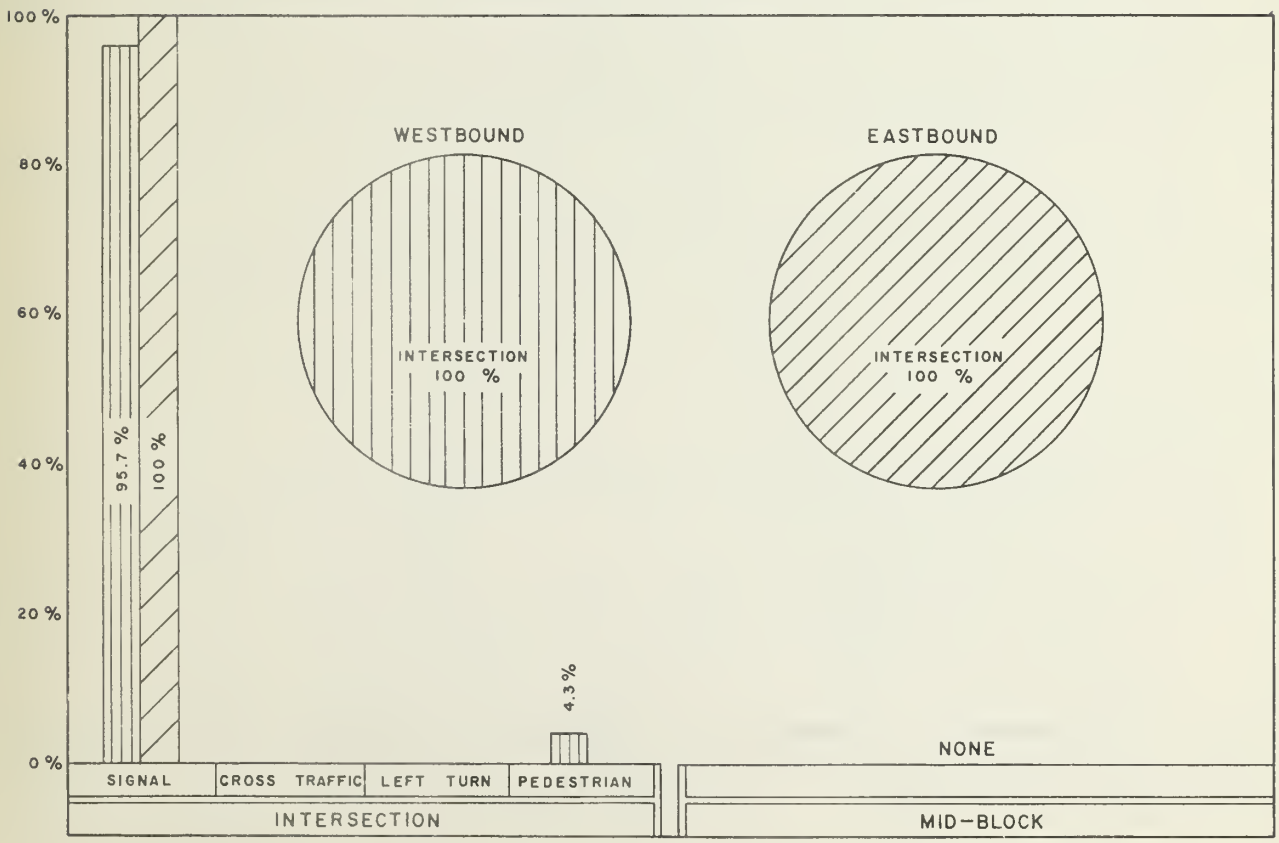


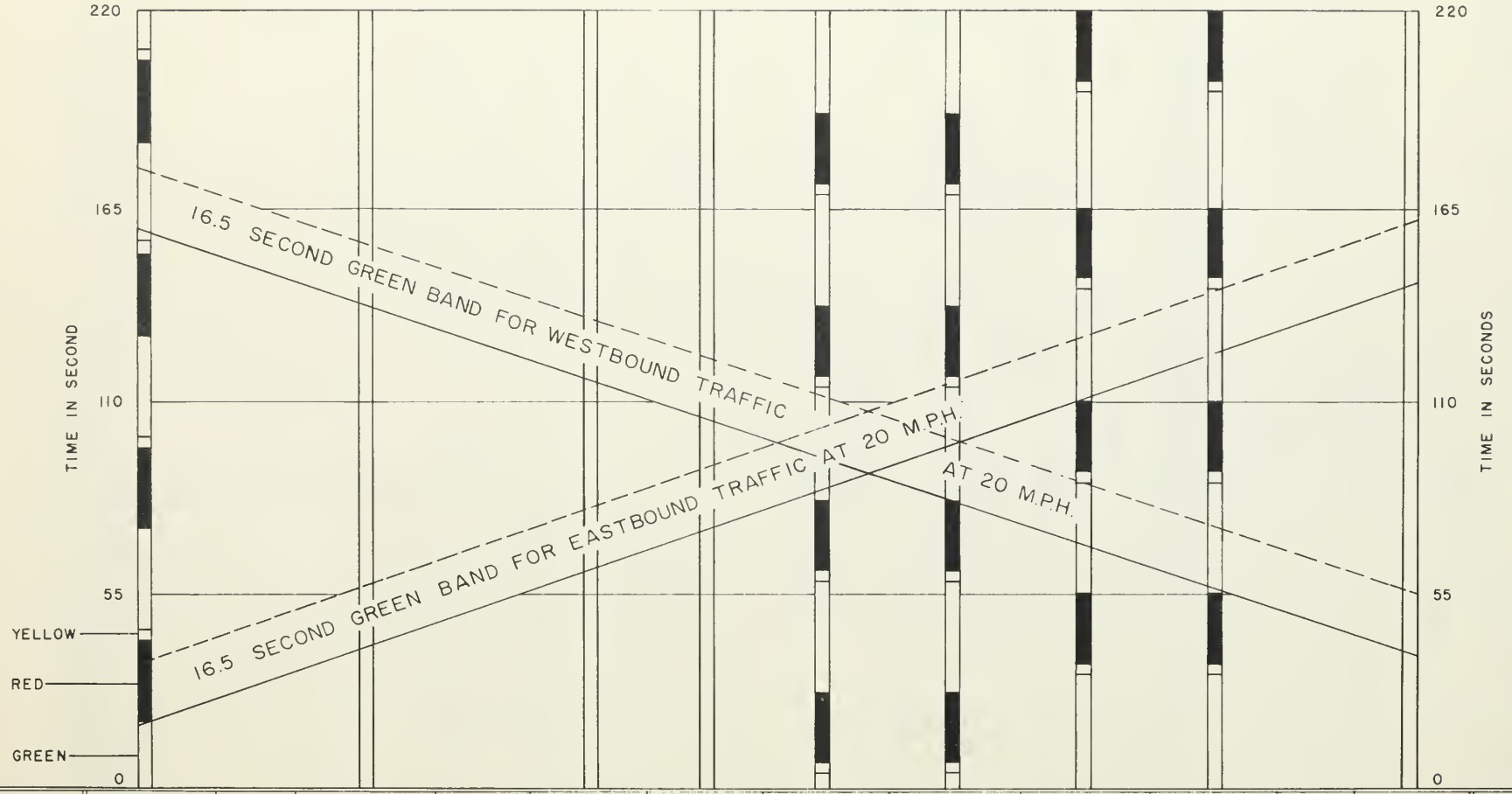
PLATE 12

BOZEMAN TRAFFIC SURVEY

PROPOSED MAIN STREET SIGNAL TIMING

55 SECOND CYCLE—DOUBLE ALTERNATE SYSTEM

PLATE 13



CROSS STREET	SEVENTH		FIFTH		THIRD	GRAND	WILLSON	TRACY	BLACK	BOZEMAN		ROUSE	CROSS STREET
TRAFFIC CONTROL	SIGNAL						SIGNAL	SIGNAL	SIGNAL	SIGNAL			TRAFFIC CONTROL
ACCUM. DISTANCE	0′		625′		1250′	1590′	1930′	2300′	2670′	3040′		3620′	ACCUM. DISTANCE
CYCLE SPLIT	55—45						65—35	65—35	65—35	65—35			CYCLE SPLIT
MAIN GREEN	29 SEC.						32 SEC.	32 SEC.	32 SEC.	32 SEC.			MAIN GREEN
MAIN YELLOW	3 SEC.						3 SEC.	3 SEC.	3 SEC.	3 SEC.			MAIN YELLOW
MAIN RED	23 SEC.						20 SEC.	20 SEC.	20 SEC.	20 SEC.			MAIN RED
CYCLE LENGTH	55 SEC.						55 SEC.	55 SEC.	55 SEC.	55 SEC.			CYCLE LENGTH
GREEN OFFSET	45 SEC.						27 SEC.	27 SEC.	0 SEC.	0 SEC.			GREEN OFFSET

BOZEMAN TRAFFIC SURVEY
URBAN ROUTE ANALYSIS
MAIN STREET BETWEEN SEVENTH AND ROUSE AVENUES

LEGEND

Ⓢ = SIGNAL

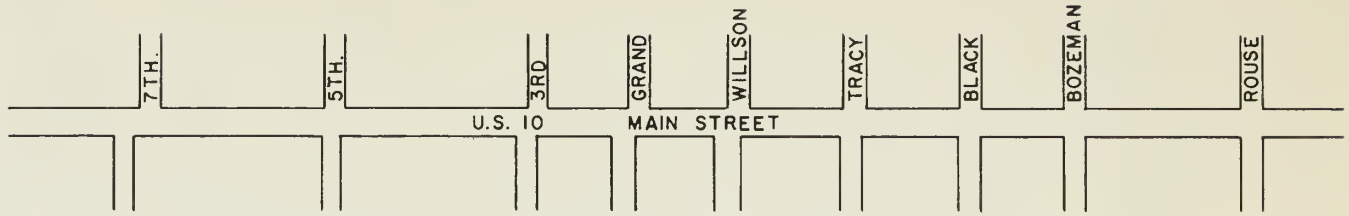
PD = PROPERTY DAMAGE

IN. = INJURIES

AVERAGE SPEED

WESTBOUND ——

EASTBOUND – – – –

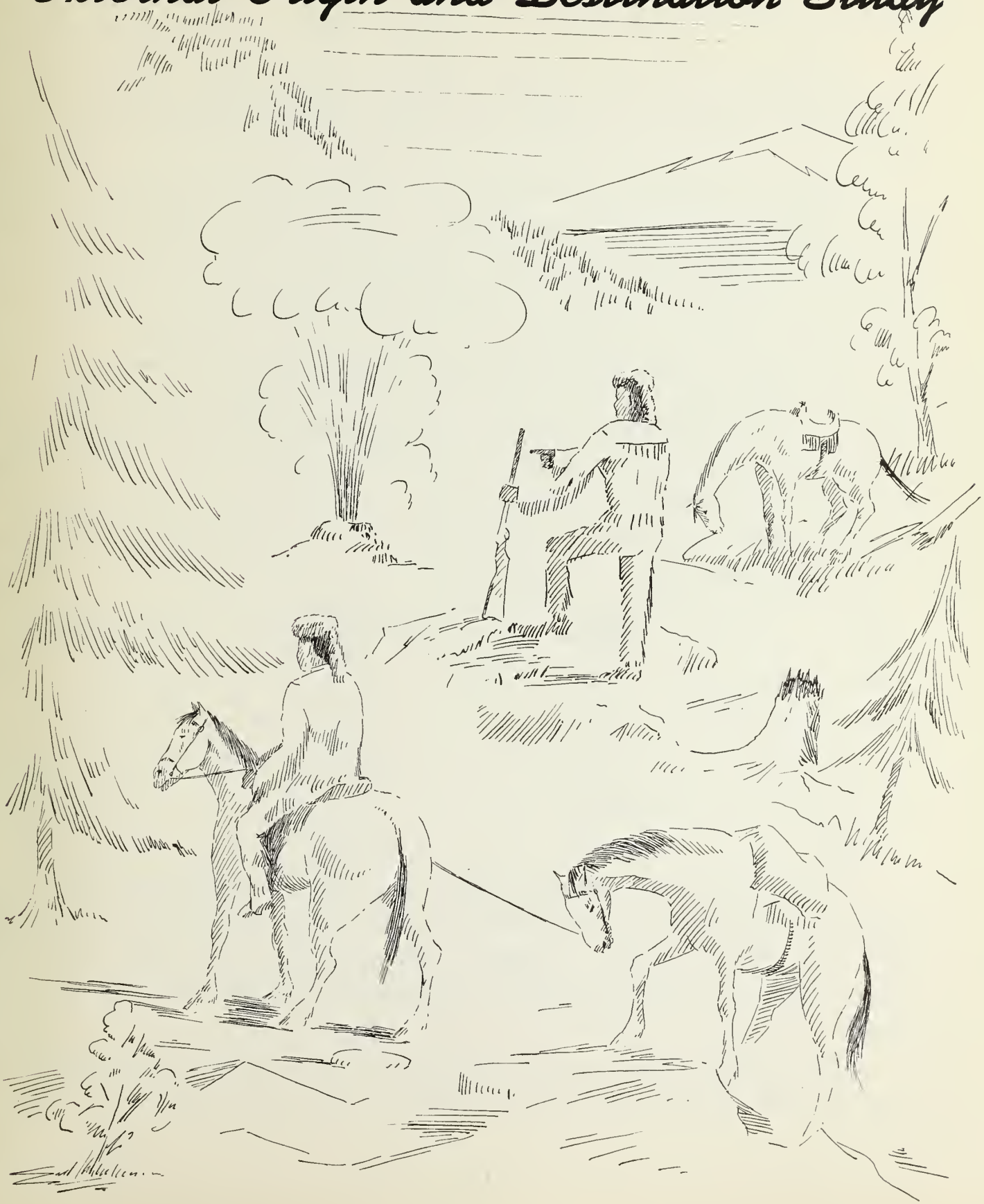


INTERSECTIONS	7 TH. AVE.	5TH. AVE.	3RD. AVE.	GRAND AVE.	WILLSON AVE.	TRACY AVE.	BLACK AVE.	BOZEMAN AVE.	ROUSE AVE.
AREA CLASSIFICATION	INTERMEDIATE			DOWNTOWN					
PAVEMENT	BITUMINOUS CONCRETE								
WIDTH & TYPE	52'-51'	62'-61'	63'	61'-59'	60'-62'	64'	65'-63'	62'-60'	
PARKING CONTROL	PARALLEL UNMETERED			PARALLEL 1 HOUR METERS					
TRAFFIC CONTROL	Ⓢ				Ⓢ	Ⓢ	Ⓢ	Ⓢ	
ACCIDENTS — NUMBER AND TYPE	1 IN. 13 PD	4 PD	6 PD	1 IN. 10 PD	10 PD	1 IN. 13 PD	1 IN. 17 PD	7 PD	
ACCIDENTS — RATE PER MILLION V.M.	48.4								
SPEED ZONES — EXISTING	NOT POSTED								
SPEED ZONES — PROPOSED									
OFF PEAK HOUR SPEED & DELAY — AVERAGE OVERALL SPEED M.P.H. 20 / 10 / 0									
CRITICAL APPROACH CAPACITY — VEHICLES PER HOUR 800 / 600 / 400 / 200 / 0	RESERVE CAPACITY								
1953 DESIGN VOLUMES									
EVALUATION	ADEQUATE UNTIL 1970								

PLATE 14

Part Three

External Origin and Destination Study



EXTERNAL ORIGIN AND DESTINATION SURVEY

A detailed study of the smallest unit in a traffic problem, the individual trip, is necessary to compile factual data concerning the entire problem.

In Bozeman information concerning the individual trip was obtained by interviewing the drivers of outbound vehicles at five stations established on the principal roads and highways near the city limits. Each station was operated a minimum of 16 hours on alternate weekdays from 6 A.M. to 10 P.M. Two stations on U.S. 10 east and west were operated for a full 24 hours.

Each driver was questioned concerning his origin, destination, and as to whether he made a stop in Bozeman. Directional classification counts were taken at each station during the hours of interviewing and portable counts of three day duration were made at each station in advance of the survey to determine the average weekday traffic.

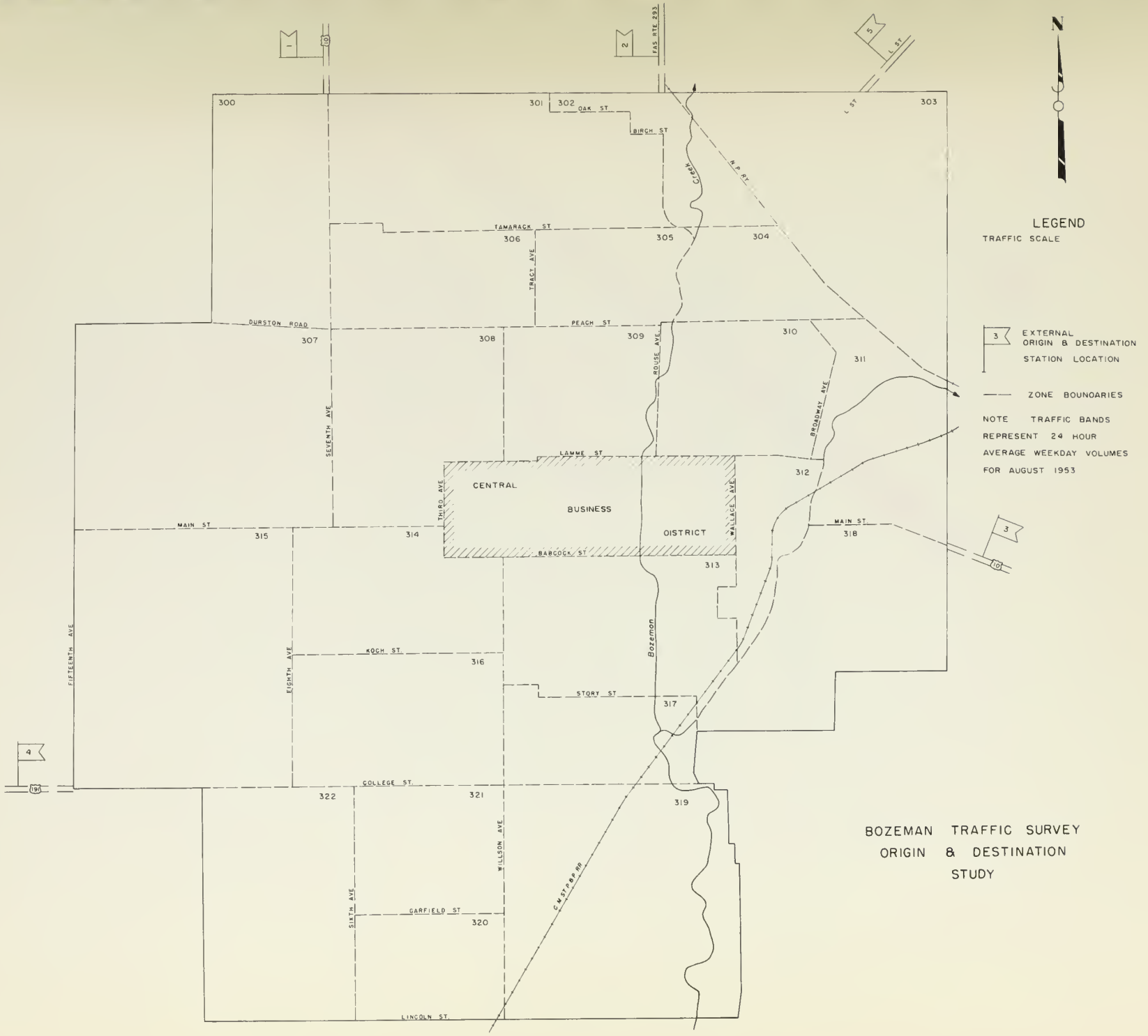
The number of interviews compared to the average weekday traffic for August 1953 for each station is as follows:

STATION	NUMBER OF INTERVIEWS	AVERAGE WEEKDAY TRAFFIC	PER CENT SAMPLE
1 U.S. 10 West	1929	3866	49.9
2 F.A.S. Route 293	281	657	42.8
3 U.S. 10 East	1468	3229	45.5
4 U.S. 191	1070	2397	44.6
5 L Street	280	707	39.6
TOTALS	5028	10856	46.3

To aid in summarizing individual trips into significant traffic patterns, Bozeman was divided into zones generally denoting land use characteristics. Each trip was then analyzed, assigned to the proper zone, and numerically coded so that it could be processed on International Business Machine equipment.

The following series of charts illustrate the distribution of passenger cars and trucks from the five external stations to the various zones.

PLATE 15


N
LEGEND
TRAFFIC SCALE
EXTERNAL ORIGIN & DESTINATION STATION LOCATION
ZONE BOUNDARIES
NOTE TRAFFIC BANDS REPRESENT 24 HOUR AVERAGE WEEKDAY VOLUMES FOR AUGUST 1953
BOZEMAN TRAFFIC SURVEY
ORIGIN & DESTINATION
STUDY
CENTRAL BUSINESS DISTRICT
OAK ST
BIRCH ST
TAMARACK ST
PEACH ST
DURSTON ROAD
LAMME ST
BABCOCK ST
MAIN ST
KOCH ST
STORY ST
COLLEGE ST
GARFIELD ST
LINCOLN ST
L ST
TRACY AVE
ROUSE AVE
BROADWAY AVE
SEVENTH AVE
THIRD AVE
WILLSON AVE
FIFTEENTH AVE
EIGHTH AVE
SIXTH AVE
Bozeman Creek
N.P. RY
C.M.ST.P.&P.RR
300
301
302
303
304
305
306
307
308
309
310
311
312
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321
322

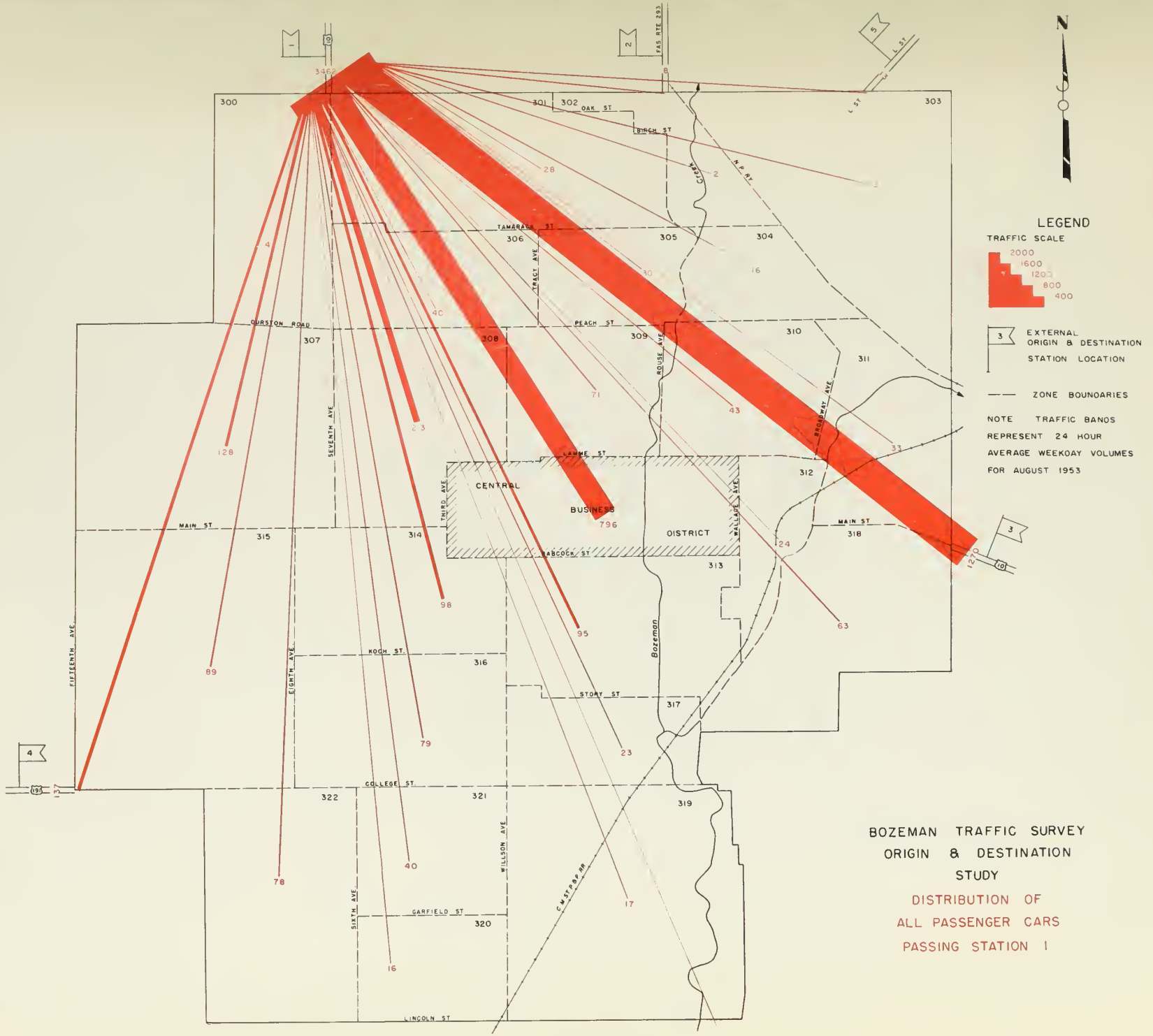
DISTRIBUTION OF ALL PASSENGER CARS PASSING STATION 1 - U. S. 10 WEST

Plate 16 illustrates traffic desire lines of all passenger cars entering and leaving Bozeman on U. S. 10 West during an average weekday in August 1953.

A summary of passenger car traffic at this station follows:

Average Weekday Traffic	3462
Per Cent to Central Business District	23.0
Per Cent Through Traffic (West - North)	0.6
Per Cent Through Traffic (West - East)	36.7
Per Cent Through Traffic (West - South)	4.0

PLATE 16



BOZEMAN TRAFFIC SURVEY
ORIGIN & DESTINATION
STUDY

DISTRIBUTION OF
ALL PASSENGER CARS
PASSING STATION 1

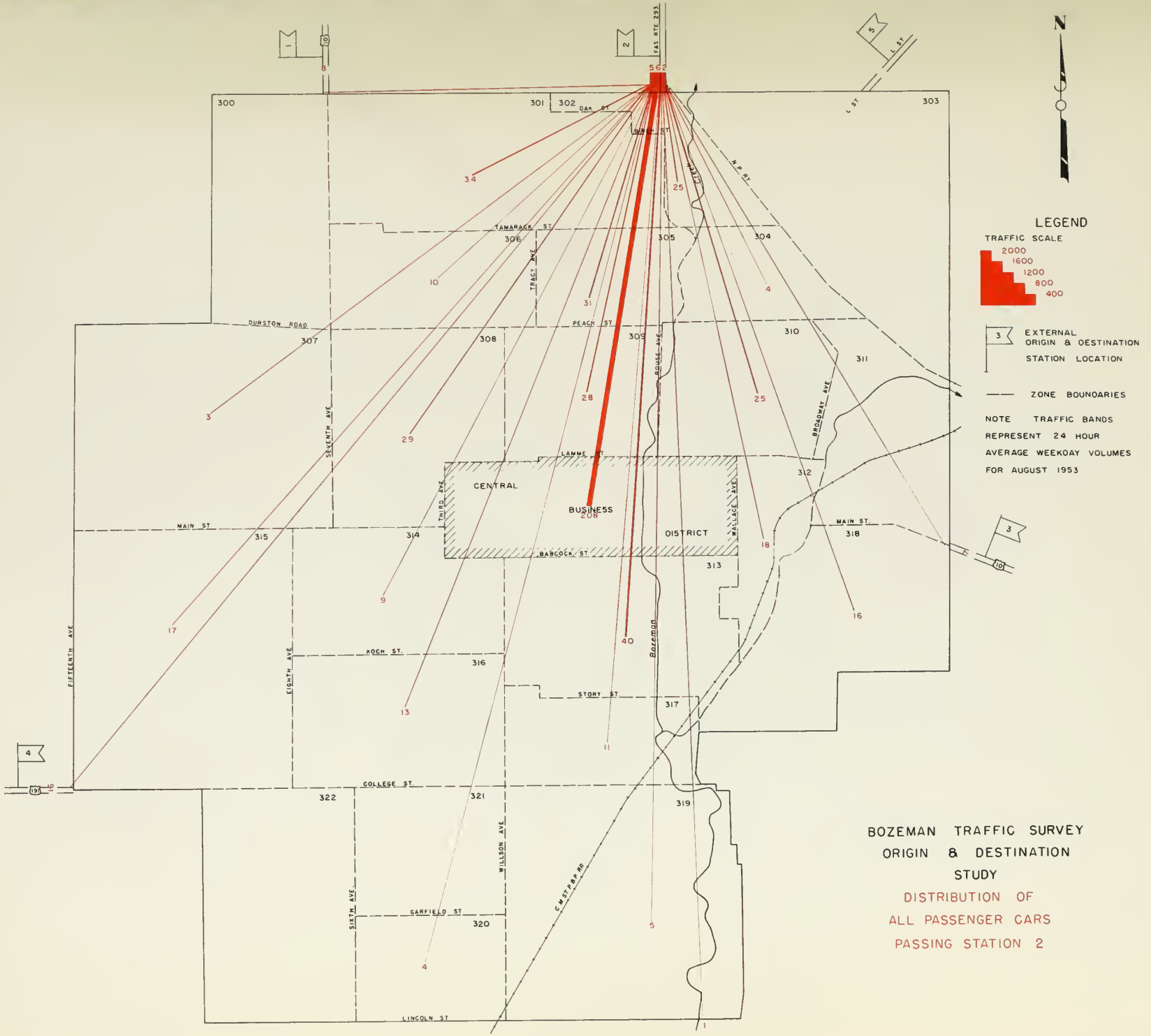
DISTRIBUTION OF ALL PASSENGER CARS PASSING STATION 2 - NORTH ROUSE AVENUE

Plate 17 illustrates traffic desire lines of all passenger cars entering and leaving Bozeman on North Rouse Avenue during an average weekday in August 1953.

A summary of passenger car traffic at this station follows:

Average Weekday Traffic	562
Per Cent to Central Business District	37.0
Per Cent Through Traffic (North - West)	1.4
Per Cent Through Traffic (North - East)	1.2
Per Cent Through Traffic (North - South)	3.0

PLATE 17



BOZEMAN TRAFFIC SURVEY
ORIGIN & DESTINATION
STUDY

DISTRIBUTION OF
ALL PASSENGER CARS
PASSING STATION 2

DISTRIBUTION OF ALL PASSENGER CARS PASSING STATION 3 - U. S. 10 EAST

Plate 18 illustrates traffic desire lines of all passenger cars entering and leaving Bozeman on U. S. 10 East during an average weekday in August 1953.

A summary of passenger car traffic at this station follows:

Average Weekday Traffic	2901
Per Cent to Central Business District	20.2
Per Cent Through Traffic (East - West)	43.8
Per Cent Through Traffic (East - South)	4.8
Per Cent Through Traffic (East - North)	0.5

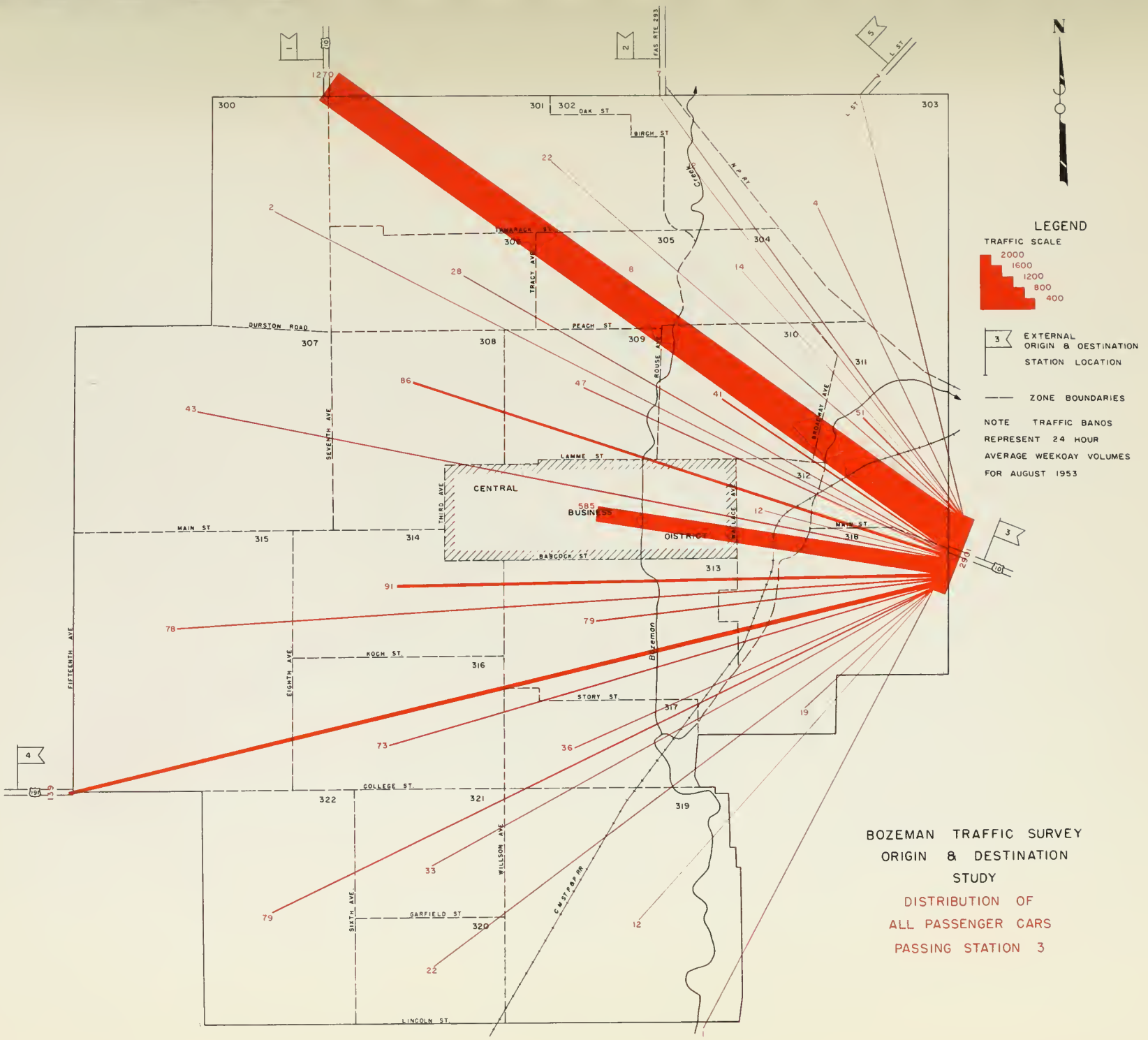

N
LEGEND
TRAFFIC SCALE
2000
1600
1200
800
400
3 EXTERNAL ORIGIN & DESTINATION STATION LOCATION
ZONE BOUNDARIES
NOTE TRAFFIC BANDS REPRESENT 24 HOUR AVERAGE WEEKDAY VOLUMES FOR AUGUST 1953
CENTRAL BUSINESS DISTRICT
585
DURSTON ROAD
OAK ST
BIRCH ST
TAMARACK ST
PEACH ST
LAMME ST
MAIN ST
BABCOCK ST
KOCH ST
STORY ST
COLLEGE ST
GARFIELD ST
LINCOLN ST
SEVENTH AVE
THIRD AVE
ROUSE AVE
BROADWAY AVE
FIFTEENTH AVE
EIGHTH AVE
SIXTH AVE
WILLSON AVE
TRACY AVE
Bozeman Creek
N.P.R.R.
C.M.ST.P.&P.RR.
L ST.
FAS RTE 293
1270
1-90
BOZEMAN TRAFFIC SURVEY
ORIGIN & DESTINATION STUDY
DISTRIBUTION OF ALL PASSENGER CARS PASSING STATION 3

PLATE 18

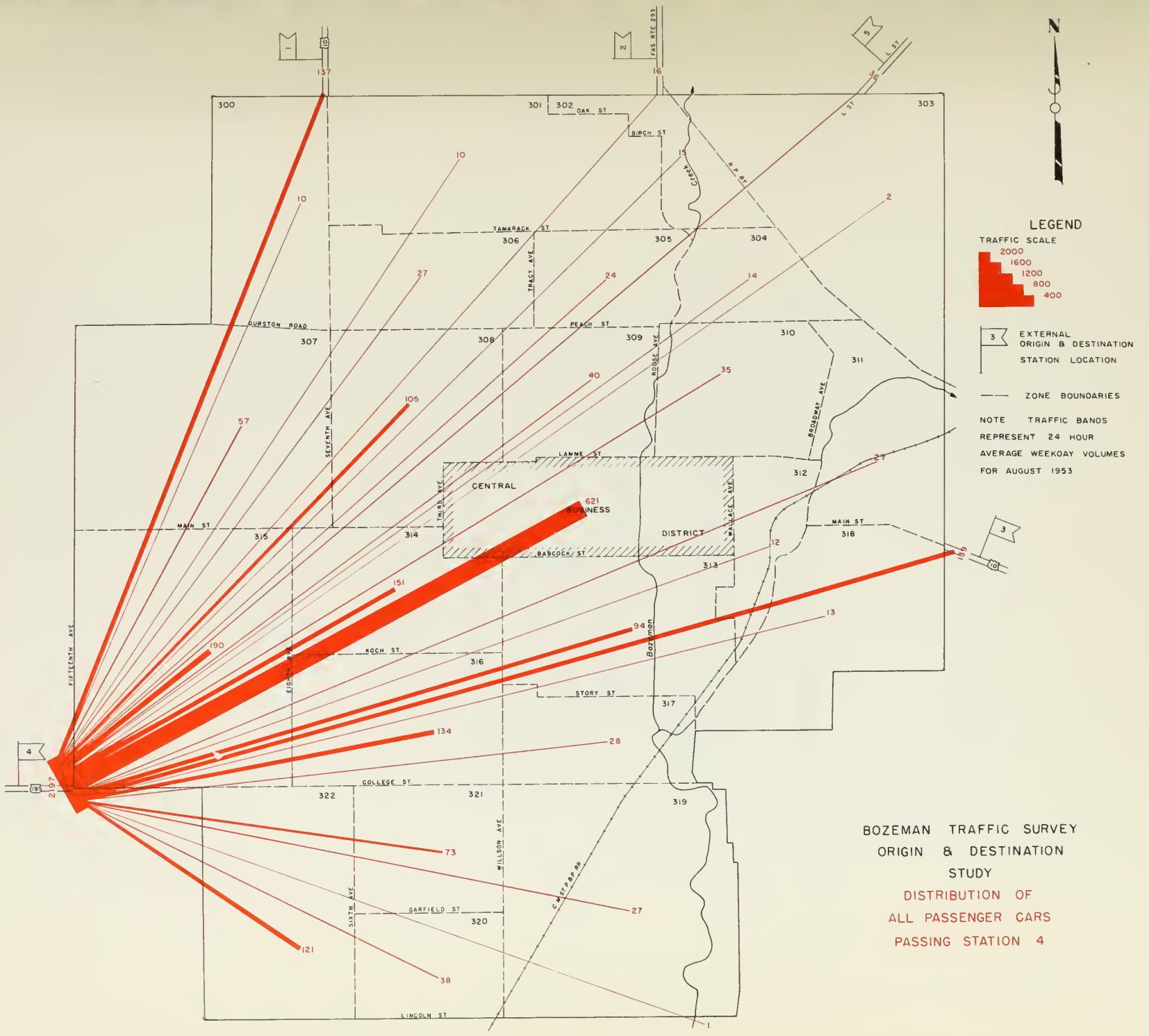
DISTRIBUTION OF ALL PASSENGER CARS PASSING STATION 4 - U. S. 191

Plate 19 illustrates traffic desire lines of all passenger cars entering and leaving Bozeman on U. S. 191 during an average weekday in August 1953.

A summary of passenger car traffic at this station follows:

Average Weekday Traffic	2197
Per Cent to Central Business District	28.3
Per Cent Through Traffic (South - West)	6.2
Per Cent Through Traffic (South - North)	2.4
Per Cent Through Traffic (South - East)	6.3

PLATE 19



BOZEMAN TRAFFIC SURVEY
ORIGIN & DESTINATION
STUDY
DISTRIBUTION OF
ALL PASSENGER CARS
PASSING STATION 4

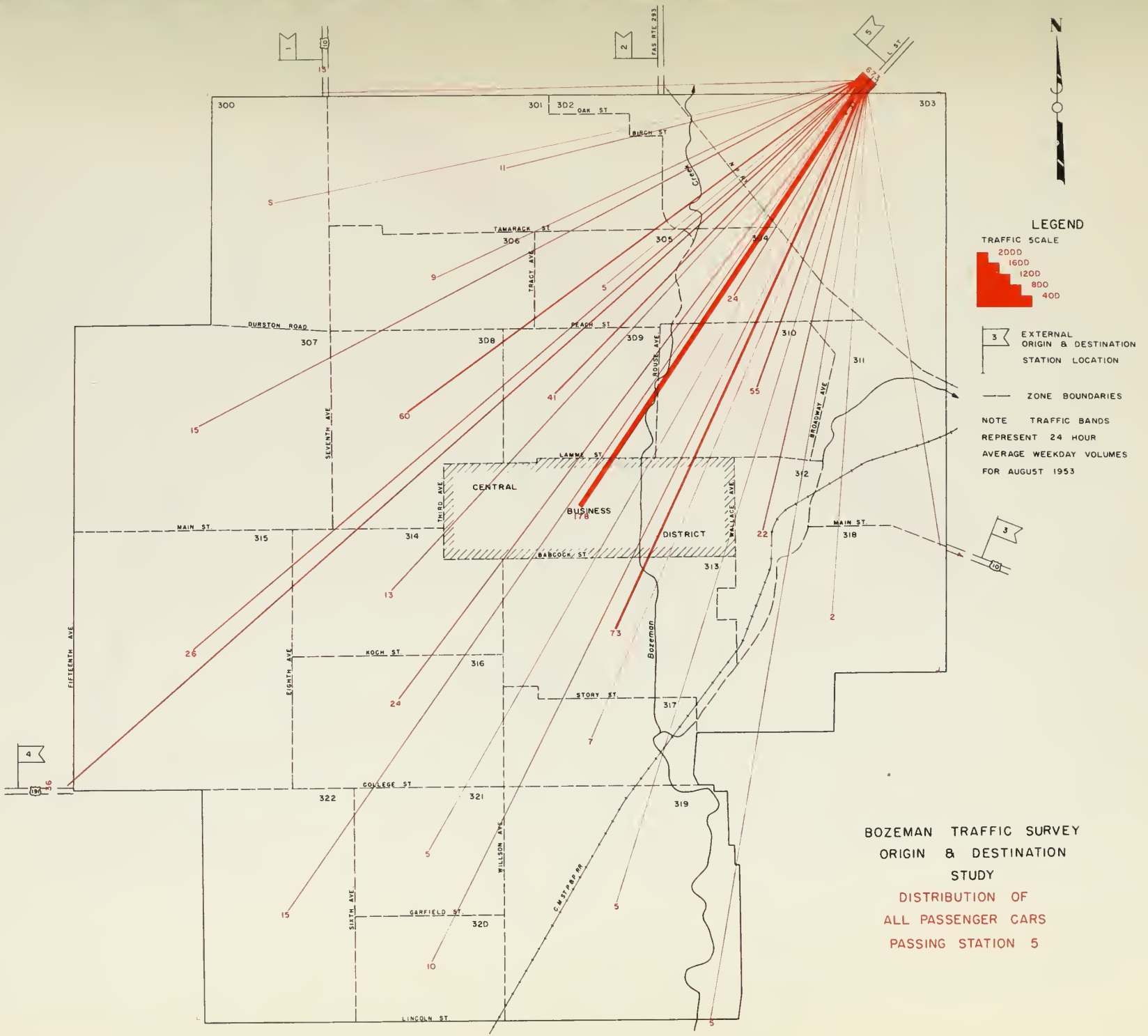
DISTRIBUTION OF ALL PASSENGER CARS PASSING STATION 5 - L STREET

Plate 20 illustrates traffic desire lines of all passenger cars entering and leaving Bozeman on L Street during an average weekday in August 1953.

A summary of passenger car traffic at this station follows:

Average Weekday Traffic	673
Per Cent to Central Business District	26.4
Per Cent Through Traffic (North - East)	1.0
Per Cent Through Traffic (North - South)	6.1
Per Cent Through Traffic (North - West)	1.9

PLATE 20


N
LEGEND
TRAFFIC SCALE
2000
1600
1200
800
400
EXTERNAL ORIGIN & DESTINATION STATION LOCATION
ZONE BOUNDARIES
NOTE TRAFFIC BANDS REPRESENT 24 HOUR AVERAGE WEEKDAY VOLUMES FOR AUGUST 1953
CENTRAL BUSINESS DISTRICT
DURSTON ROAD
MAIN ST.
LAMME ST.
BABCOCK ST.
PEACH ST.
TAMARACK ST.
OAK ST.
BIRCH ST.
KOCH ST.
STORY ST.
COLLEGE ST.
GARFIELD ST.
LINCOLN ST.
SEVENTH AVE.
TRACY AVE.
ROUSE AVE.
BROADWAY AVE.
PALACE AVE.
THIRD AVE.
FIFTEENTH AVE.
EIGHTH AVE.
SIXTH AVE.
WILLSON AVE.
Bozeman Creek
C.M.St.P.&P.RR.
L ST.
FAS RTE 293
300
301
302
303
305
306
307
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311
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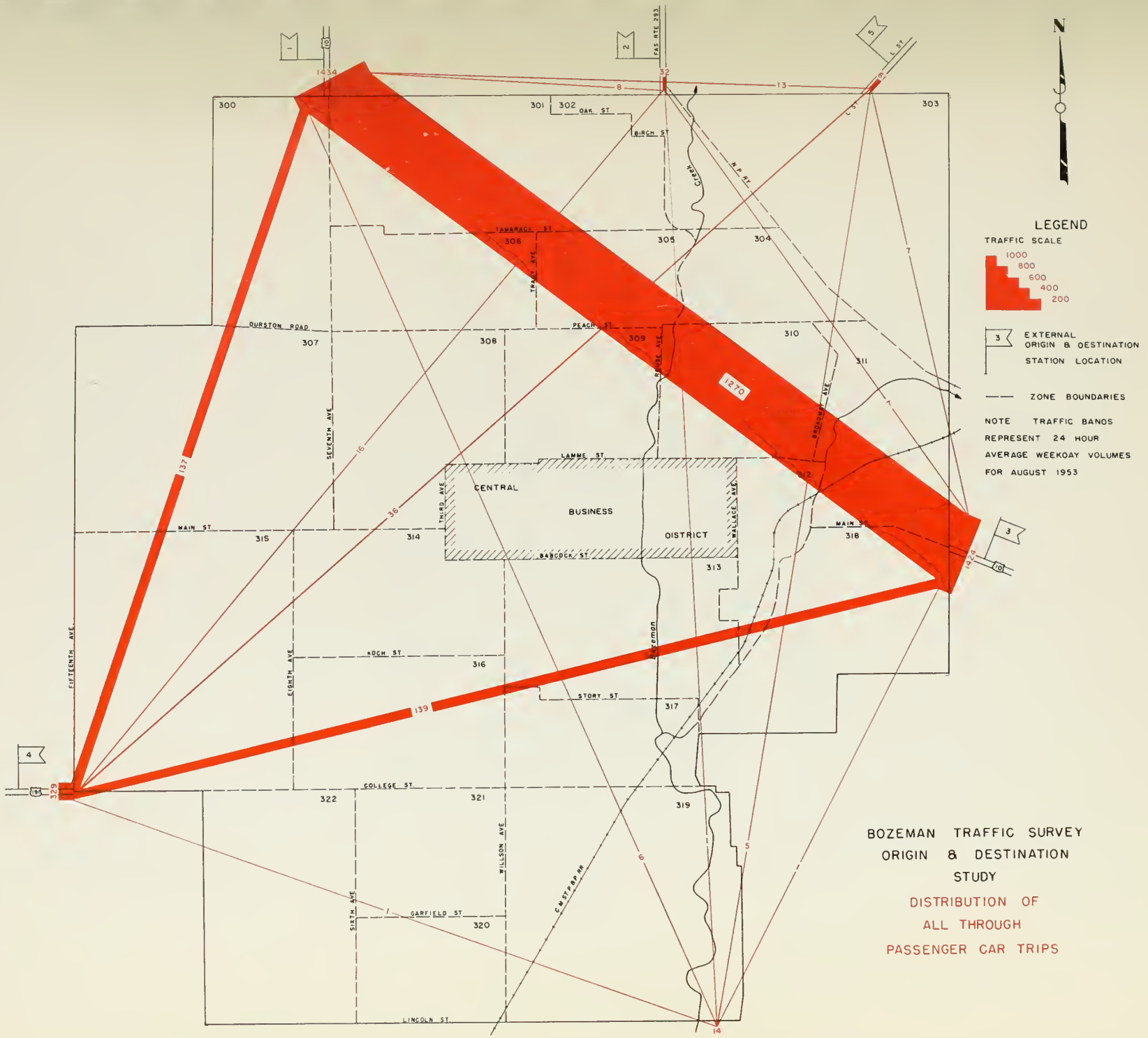
322
BOZEMAN TRAFFIC SURVEY
ORIGIN & DESTINATION
STUDY
DISTRIBUTION OF
ALL PASSENGER CARS
PASSING STATION 5

DISTRIBUTION OF ALL THROUGH PASSENGER CAR TRIPS

Plate 21 illustrates the interchange of all through passenger car trips between external stations on an average weekday in August 1953.


N
LEGEND
TRAFFIC SCALE
1000
800
600
400
200
EXTERNAL ORIGIN & DESTINATION STATION LOCATION
ZONE BOUNDARIES
NOTE TRAFFIC BANDS REPRESENT 24 HOUR AVERAGE WEEKDAY VOLUMES FOR AUGUST 1953
BOZEMAN TRAFFIC SURVEY
ORIGIN & DESTINATION STUDY
DISTRIBUTION OF ALL THROUGH PASSENGER CAR TRIPS
CENTRAL BUSINESS DISTRICT
MAIN ST.
BABCOCK ST.
LAMME ST.
KOCH ST.
STORY ST.
COLLEGE ST.
GARFIELD ST.
LINCOLN ST.
DURSTON ROAD
PEACH ST.
TAMARACK ST.
OAK ST.
BIRCH ST.
L ST.
FIFTEENTH AVE.
SEVENTH AVE.
EIGHTH AVE.
SIXTH AVE.
THIRD AVE.
WALLACE AVE.
RIDGE AVE.
BROADWAY AVE.
WILLSON AVE.
Bozeman
C M ST P&P RR
N P RY.
CREEK
1270
137
139
36
16
8
13
7
6
5
14
1434
1424
300
301
302
303
304
305
306
307
308
309
310
311
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321
322
329

PLATE 21

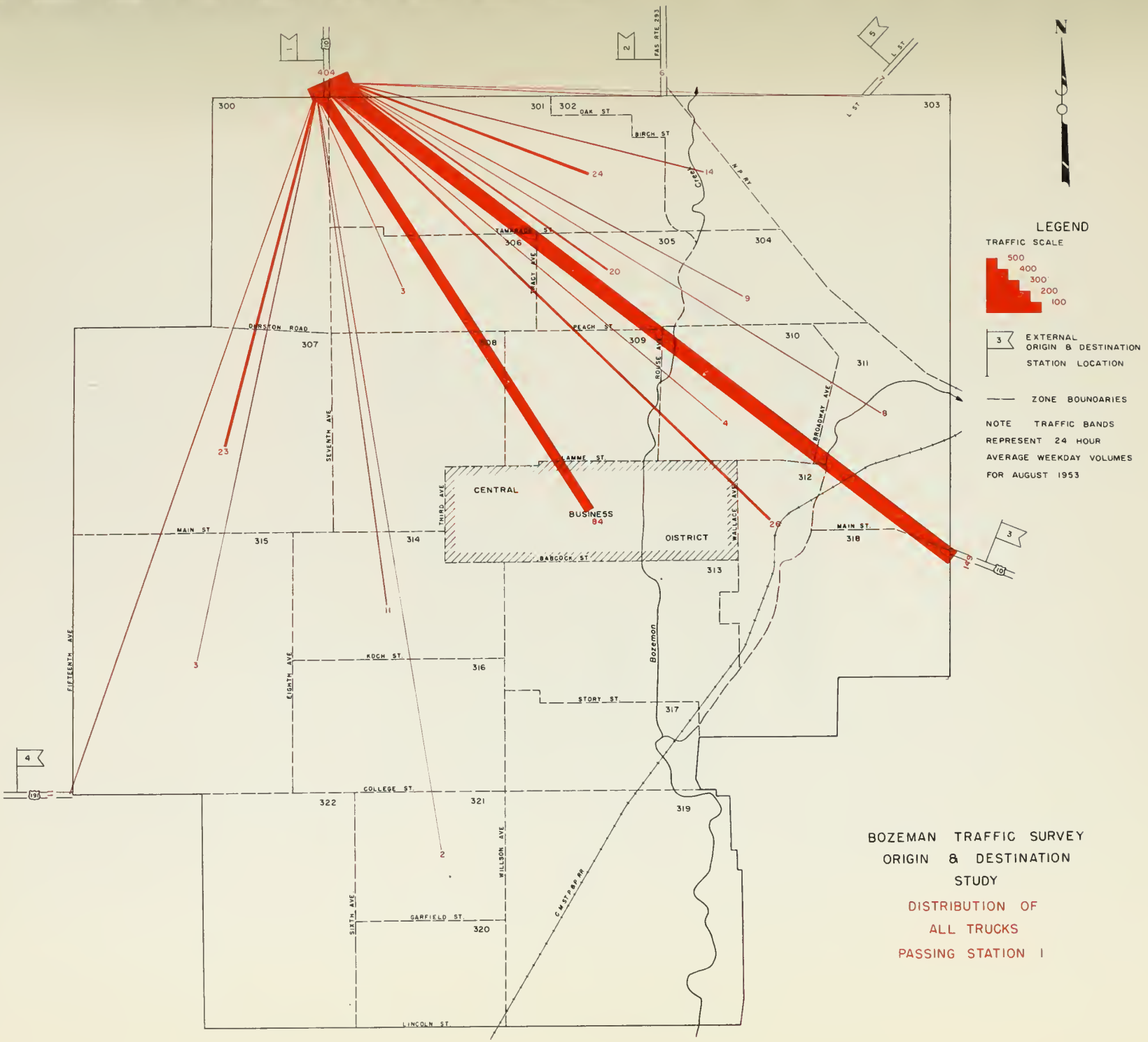
DISTRIBUTION OF ALL TRUCKS PASSING STATION 1 - U. S. 10 WEST

Plate 22 illustrates traffic desire lines of all medium and heavy commercial vehicles entering or leaving Bozeman on U. S. 10 West during an average weekday in August 1953.

A summary of commercial traffic at this station follows:

Average Daily Commercial Traffic	404
Per Cent to Central Business District	20.1
Per Cent Through Traffic (West - East)	36.9
Per Cent Through Traffic (West - South)	2.7
Per Cent Through Traffic (West - North)	3.2

PLATE 22



BOZEMAN TRAFFIC SURVEY
ORIGIN & DESTINATION
STUDY

DISTRIBUTION OF
ALL TRUCKS
PASSING STATION 1

DISTRIBUTION OF ALL TRUCKS PASSING STATION 2 - NORTH ROUSE AVENUE

Plate 23 illustrates traffic desire lines of all medium and heavy commercial vehicles entering or leaving Bozeman on North Rouse Avenue during an average weekday in August 1953.

A summary of commercial traffic at this station follows:

Average Daily Commercial Traffic	95
Per Cent to Central Business District	26.3
Per Cent Through Traffic (North - East)	1.1
Per Cent Through Traffic (North - South)	9.5
Per Cent Through Traffic (North - West)	6.3

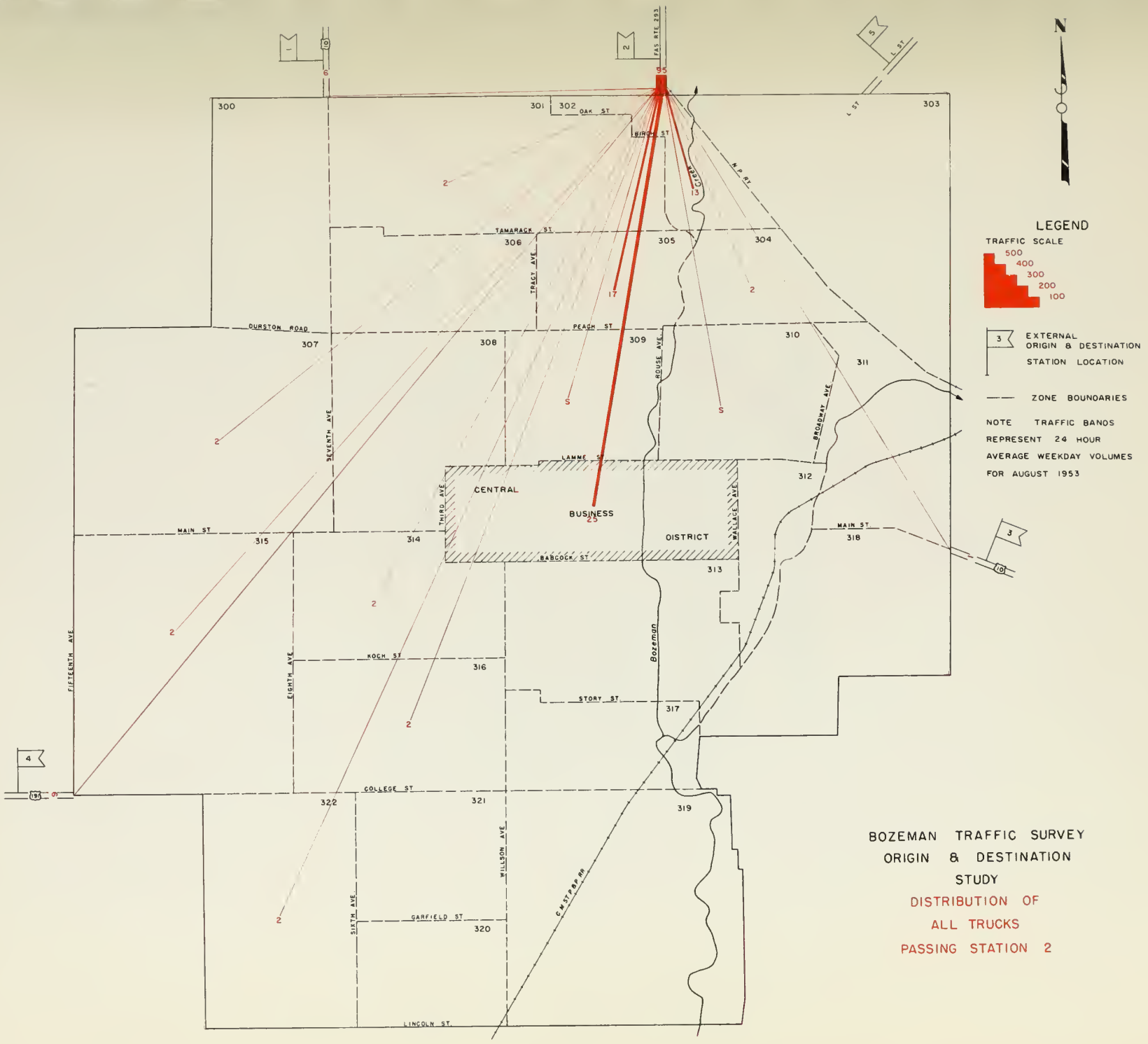

N
LEGEND
TRAFFIC SCALE
500
400
300
200
100
EXTERNAL ORIGIN & DESTINATION STATION LOCATION
ZONE BOUNDARIES
NOTE TRAFFIC BANDS REPRESENT 24 HOUR AVERAGE WEEKDAY VOLUMES FOR AUGUST 1953
CENTRAL BUSINESS DISTRICT
OAK ST
BIRCH ST
TAMARACK ST
DURSTON ROAD
PEACH ST
LAMME ST
MAIN ST
BABCOCK ST
KOCH ST
STORY ST
COLLEGE ST
GARFIELD ST
LINCOLN ST
SEVENTH AVE
FIFTEENTH AVE
EIGHTH AVE
SIXTH AVE
THIRD AVE
WALLACE AVE
ROUSE AVE
BROADWAY AVE
TRACY AVE
WILLSON AVE
Bozeman
CREEK
M. P. RY.
C.M.ST.P.&P.RR.
L ST
FAS RTE 293
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
BOZEMAN TRAFFIC SURVEY
ORIGIN & DESTINATION
STUDY
DISTRIBUTION OF
ALL TRUCKS
PASSING STATION 2

PLATE 23

DISTRIBUTION OF ALL TRUCKS PASSING STATION 3 - U. S. 10 EAST

Plate 24 illustrates traffic desire lines of all medium and heavy commercial vehicles entering or leaving Bozeman on U. S. 10 East during an average weekday in August 1953.

A summary of commercial traffic at this station follows.

Average Daily Commercial Traffic	328
Per Cent to Central Business District	13.4
Per Cent Through Traffic (East - South)	9.5
Per Cent Through Traffic (East - West)	45.4
Per Cent Through Traffic (East - North)	0.9

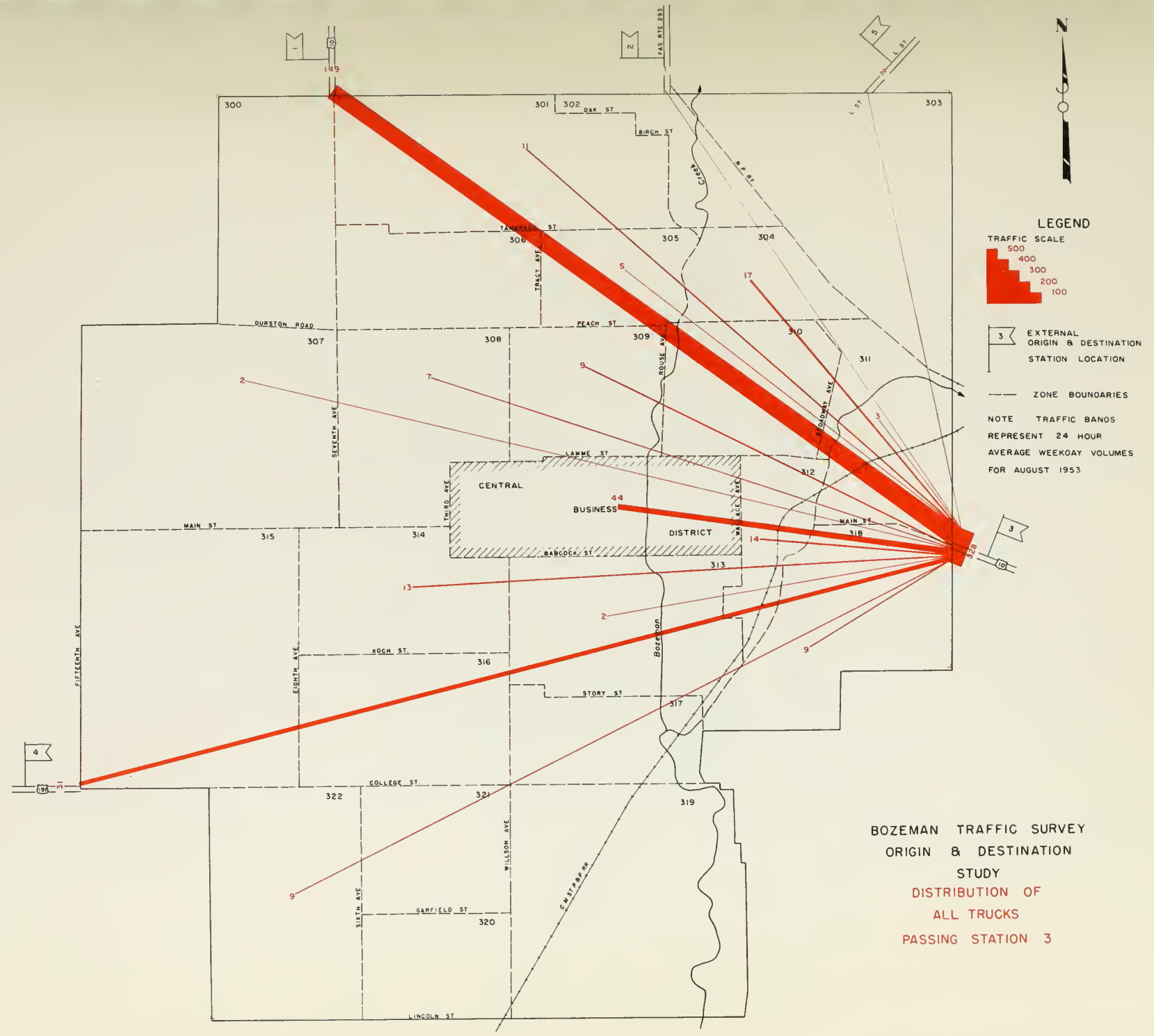

N
LEGEND
TRAFFIC SCALE
500
400
300
200
100
3 EXTERNAL ORIGIN & DESTINATION STATION LOCATION
ZONE BOUNDARIES
NOTE TRAFFIC BANDS REPRESENT 24 HOUR AVERAGE WEEKDAY VOLUMES FOR AUGUST 1953
CENTRAL BUSINESS DISTRICT
MAIN ST
BABCOCK ST
LAMME ST
DURSTON ROAD
PEACH ST
TAMARACK ST
OAK ST
BIRCH ST
KOCH ST
STORY ST
COLLEGE ST
GARFIELD ST
LINCOLN ST
SEVENTH AVE
TRACT AVE
ROUSE AVE
BOZEMAN AVE
THIRD AVE
WALLACE AVE
FIFTEENTH AVE
EIGHTH AVE
WILLSON AVE
SIXTH AVE
Bozeman
Creek
N P RY
C M ST P & P RR
L ST
FAS RTE 293
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
328
BOZEMAN TRAFFIC SURVEY
ORIGIN & DESTINATION
STUDY
DISTRIBUTION OF
ALL TRUCKS
PASSING STATION 3

PLATE 24

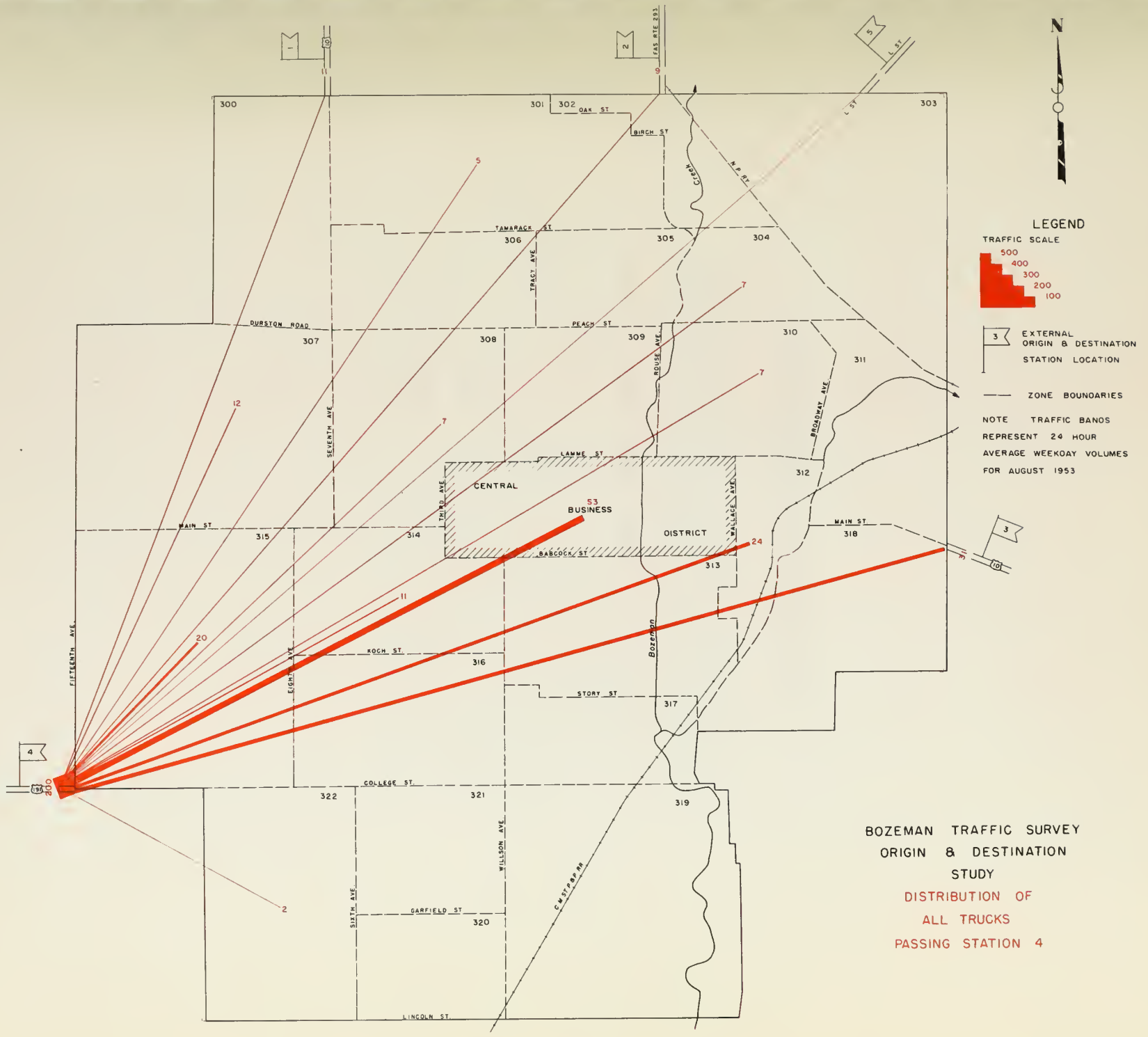
DISTRIBUTION OF ALL TRUCKS PASSING STATION 4 - U. S. 191

Plate 25 illustrates traffic desire lines of all medium and heavy commercial vehicles entering or leaving Bozeman on U. S. 191 during an average weekday in August 1953.

A summary of commercial traffic at this station follows:

Average Daily Commercial Traffic	200
Per Cent to Central Business District	26.5
Per Cent Through Traffic (South - West)	5.5
Per Cent Through Traffic (South - North)	20.0
Per Cent Through Traffic (South - East)	15.5

PLATE 25


N
LEGEND
TRAFFIC SCALE
500
400
300
200
100
3 EXTERNAL ORIGIN & DESTINATION STATION LOCATION
ZONE BOUNDARIES
NOTE TRAFFIC BANDS REPRESENT 24 HOUR AVERAGE WEEKDAY VOLUMES FOR AUGUST 1953
BOZEMAN TRAFFIC SURVEY
ORIGIN & DESTINATION
STUDY
DISTRIBUTION OF
ALL TRUCKS
PASSING STATION 4
CENTRAL
BUSINESS
DISTRICT
53
24
20
12
11
7
5
2
OAK ST
BIRCH ST
TAMARACK ST
DURSTON ROAD
PEACH ST
LAMME ST
MAIN ST
BABCOCK ST
ROCH ST
STORY ST
COLLEGE ST
GARFIELD ST
LINCOLN ST
TRACY AVE
SEVENTH AVE
FIFTEENTH AVE
EIGHTH AVE
SIXTH AVE
THIRD AVE
ROUSE AVE
WALLACE AVE
BROADWAY AVE
WILLSON AVE
Bozeman
Creek
N P RY
C M ST P & P RR
L ST
300
301
302
303
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322

DISTRIBUTION OF ALL TRUCKS PASSING STATION 5 - L STREET

Plate 26 illustrates traffic desire lines of all medium and heavy commercial vehicles entering or leaving Bozeman on L Street during an average weekday in August 1953.

A summary of commercial traffic at this station follows:

Average Daily Commercial Traffic	34
Per Cent to Central Business District	32.4
Per Cent Through Traffic (North - East)	5.9
Per Cent Through Traffic (North - South)	2.9
Per Cent Through Traffic (North - West)	20.6

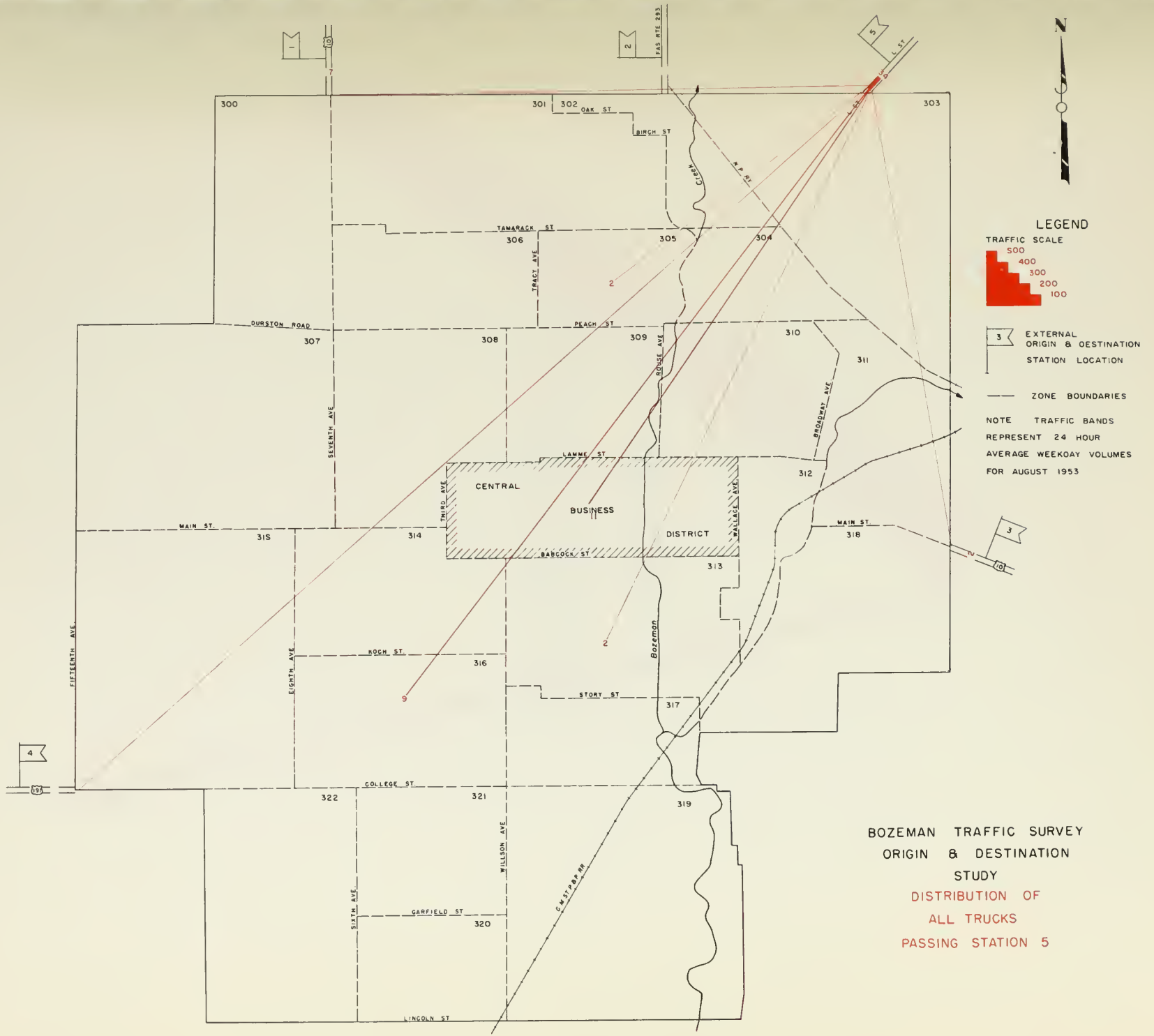
N
LEGEND
TRAFFIC SCALE
500
400
300
200
100
EXTERNAL ORIGIN & DESTINATION STATION LOCATION
ZONE BOUNDARIES
NOTE TRAFFIC BANDS REPRESENT 24 HOUR AVERAGE WEEKDAY VOLUMES FOR AUGUST 1953
BOZEMAN TRAFFIC SURVEY
ORIGIN & DESTINATION STUDY
DISTRIBUTION OF ALL TRUCKS PASSING STATION 5
CENTRAL BUSINESS DISTRICT
OAK ST
BIRCH ST
TAMARACK ST
DURSTON ROAD
PEACH ST
LAMME ST
MAIN ST
BABCOCK ST
ROCH ST
STORY ST
COLLEGE ST
GARFIELD ST
LINCOLN ST
SEVENTH AVE
TRACY AVE
ROUSE AVE
BROADWAY AVE
THIRD AVE
WALLACE AVE
FIFTEENTH AVE
EIGHTH AVE
SIXTH AVE
WILLSON AVE
Bozeman
Creek
A.P. RY.
C.M.ST.P.&P. RR
FAS RTE 293
L ST
300
301
302
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PLATE 26

DISTRIBUTION OF ALL THROUGH TRUCK TRIPS

Plate 27 illustrates the interchange of through trips made by medium and heavy commercial vehicles on an average weekday in August 1953.

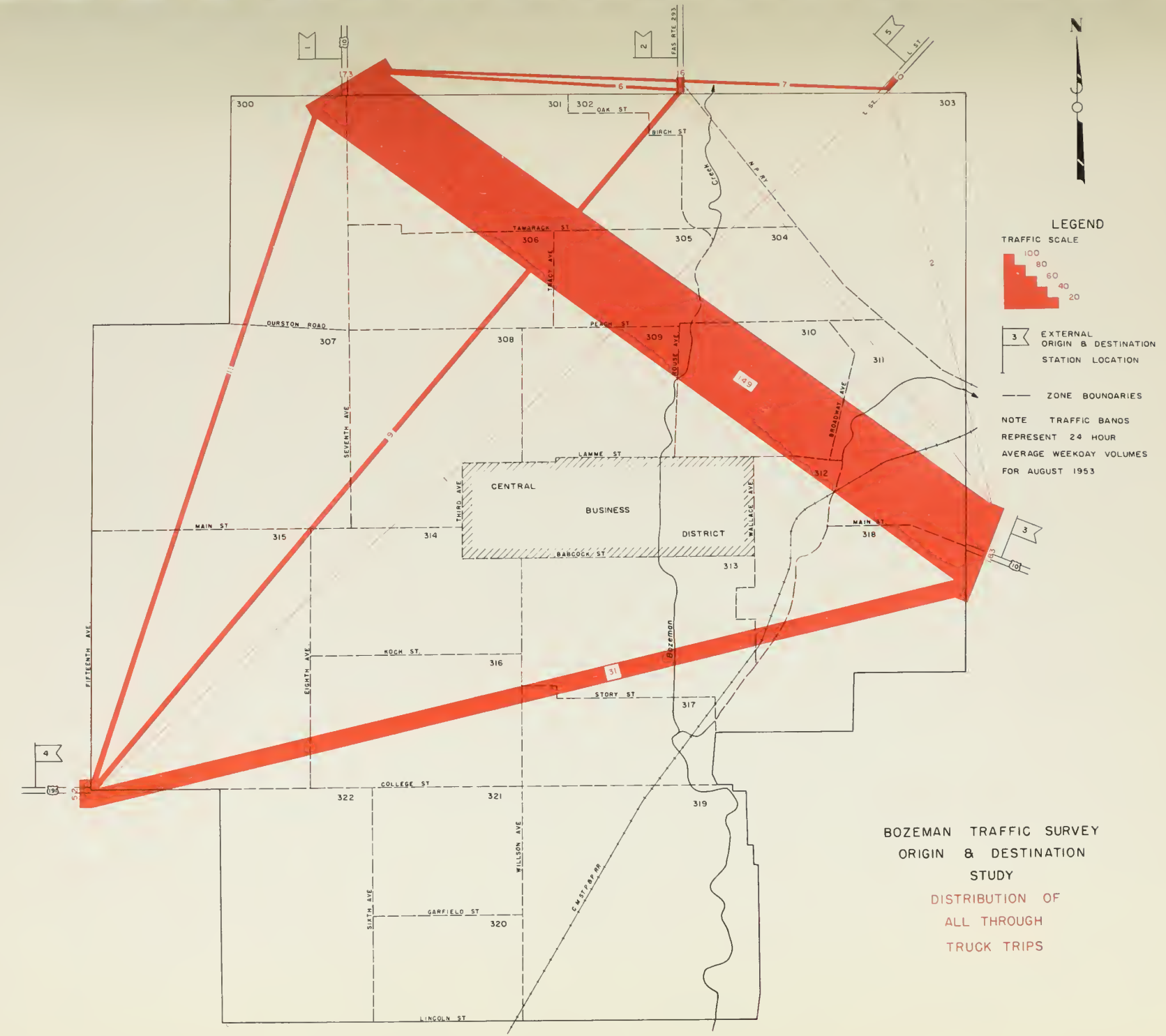
N
LEGEND
TRAFFIC SCALE
100
80
60
40
20
3 EXTERNAL ORIGIN & DESTINATION STATION LOCATION
ZONE BOUNDARIES
NOTE TRAFFIC BANDS REPRESENT 24 HOUR AVERAGE WEEKDAY VOLUMES FOR AUGUST 1953
CENTRAL BUSINESS DISTRICT
Bozeman
149
31
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
OAK ST
BIRCH ST
TAMARACK ST
DURSTON ROAD
PEACH ST
LAMME ST
MAIN ST
BABCOCK ST
ROCH ST
STORY ST
COLLEGE ST
GARFIELD ST
LINCOLN ST
FIFTEENTH AVE.
SEVENTH AVE
EIGHTH AVE
SIXTH AVE
THIRD AVE
TRACY AVE
ROUSE AVE
BROADWAY AVE
WALLACE AVE
WILLSON AVE
CREEK
N P RY
C M ST P & P RR
L ST
FAS RTE 293
BOZEMAN TRAFFIC SURVEY
ORIGIN & DESTINATION
STUDY
DISTRIBUTION OF
ALL THROUGH
TRUCK TRIPS

PLATE 27